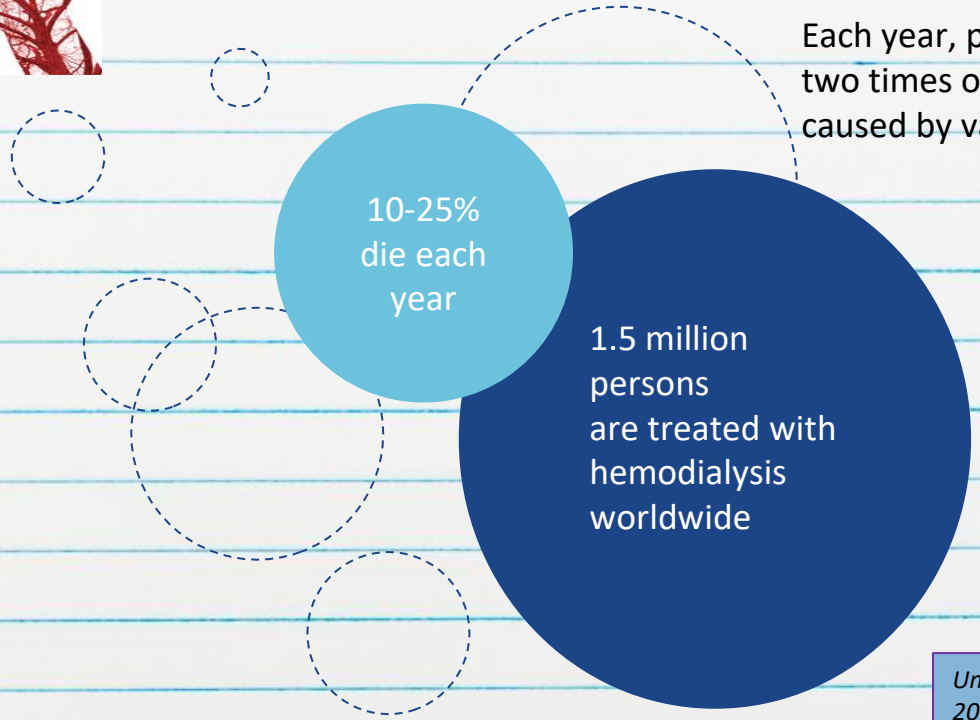
Λοιμώξεις αγγειακής προσπέλασης σε αιμοκαθαιρόμενους ασθενείς

Επιπλοκές

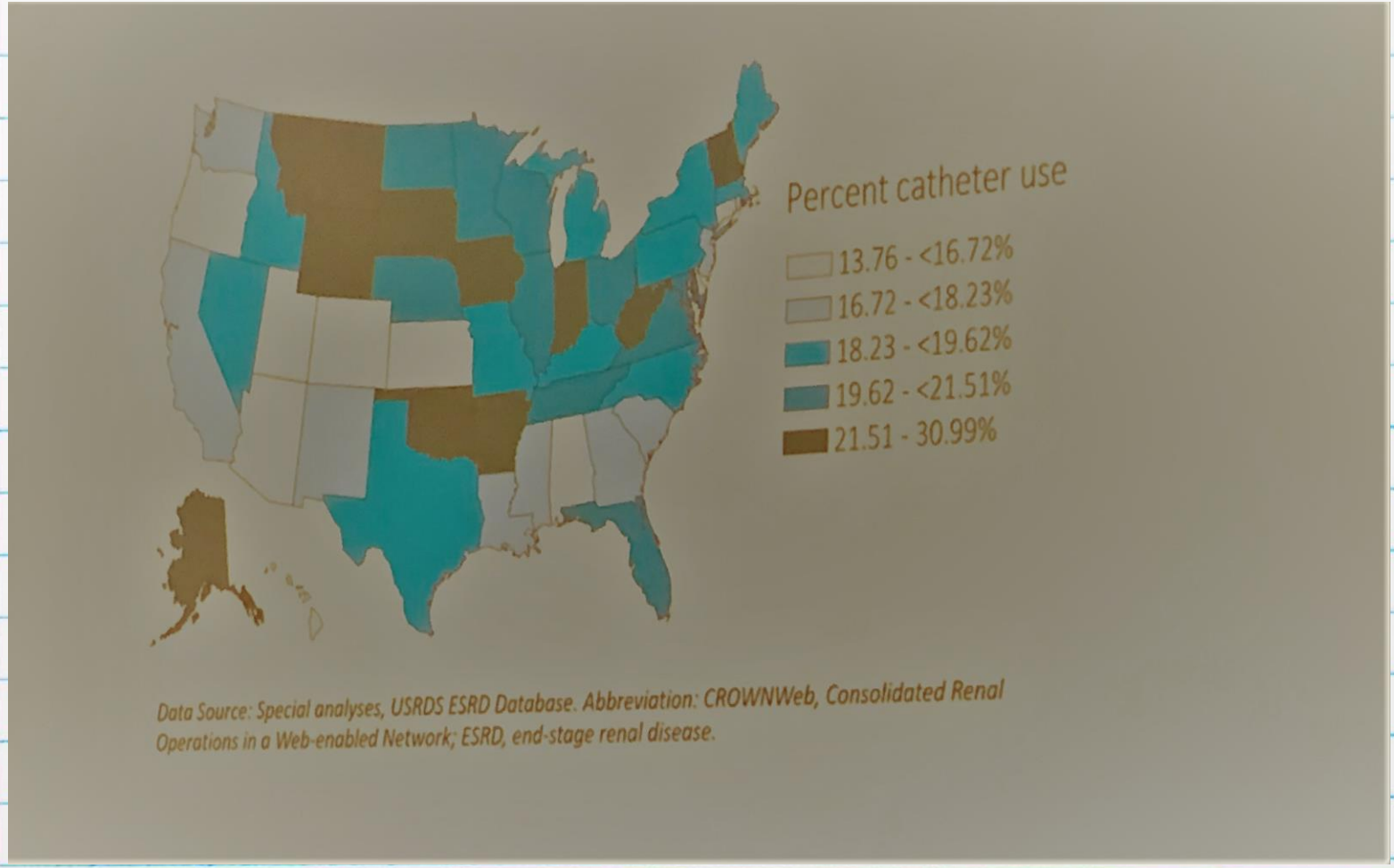
Ιωάννης Γ. Γριβέας, MD, PhD
Νεφρολόγος

athens-NEPHROLOGY

Each year, persons on hemodialysis are hospitalized two times on average, with 1 in 10 hospitalizations caused by vascular access infection.

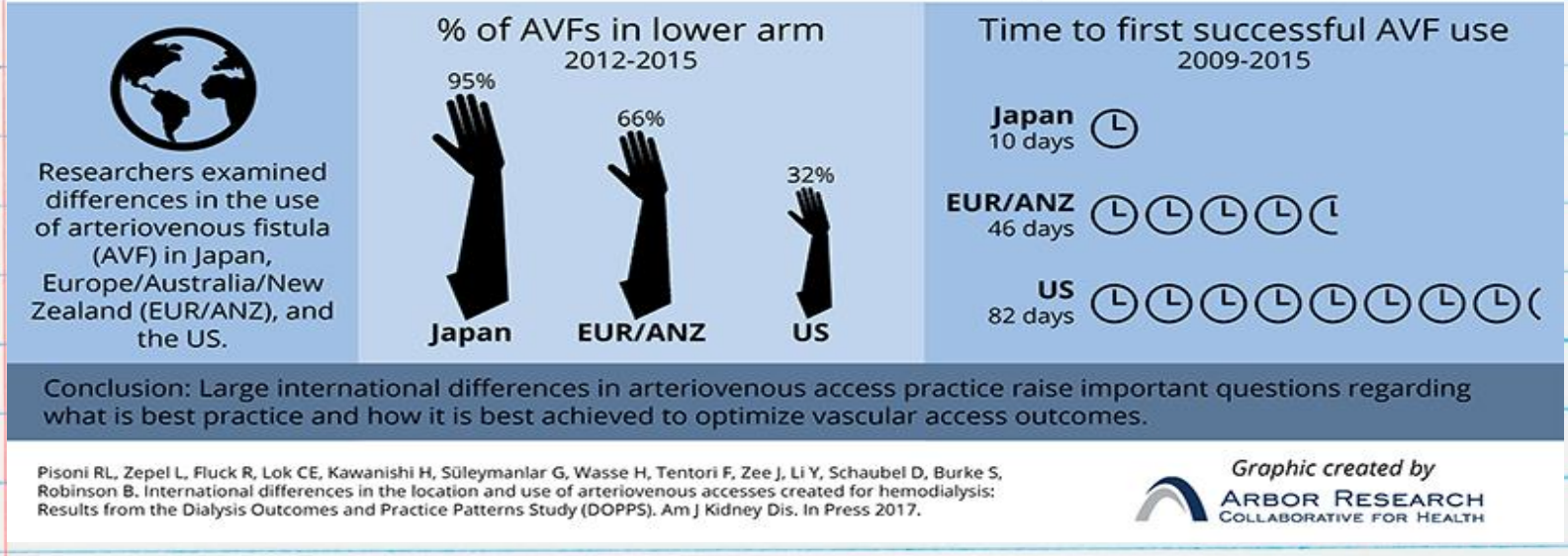


United States Renal Data System: Annual Data Report, 2011. Available at: http://www.usrds.org/adr.aspx. Accessed April 20, 2012



Data Source: Special analyses, USRDS ESRD Database. Abbreviation: CROWNWeb, Consolidated Renal Operations in a Web-enabled Network; ESRD, end-stage renal disease.

International Differences in Arteriovenous Accesses for Hemodialysis



Pisoni RL, Zepel L, Fluck R, Lok CE, Kawanishi H, Süleymanlar G, Wasse H, Tentori F, Zee J, Li Y, Schaubel D, Burke S, Robinson B. International differences in the location and use of arteriovenous accesses created for hemodialysis: Results from the Dialysis Outcomes and Practice Patterns Study (DOPPS). Am J Kidney Dis. In Press 2017.

Graphic created by
ARBOR RESEARCH
COLLABORATIVE FOR HEALTH

arteriovenous
FISTULA FIRST
AVF — The first choice for hemodialysis

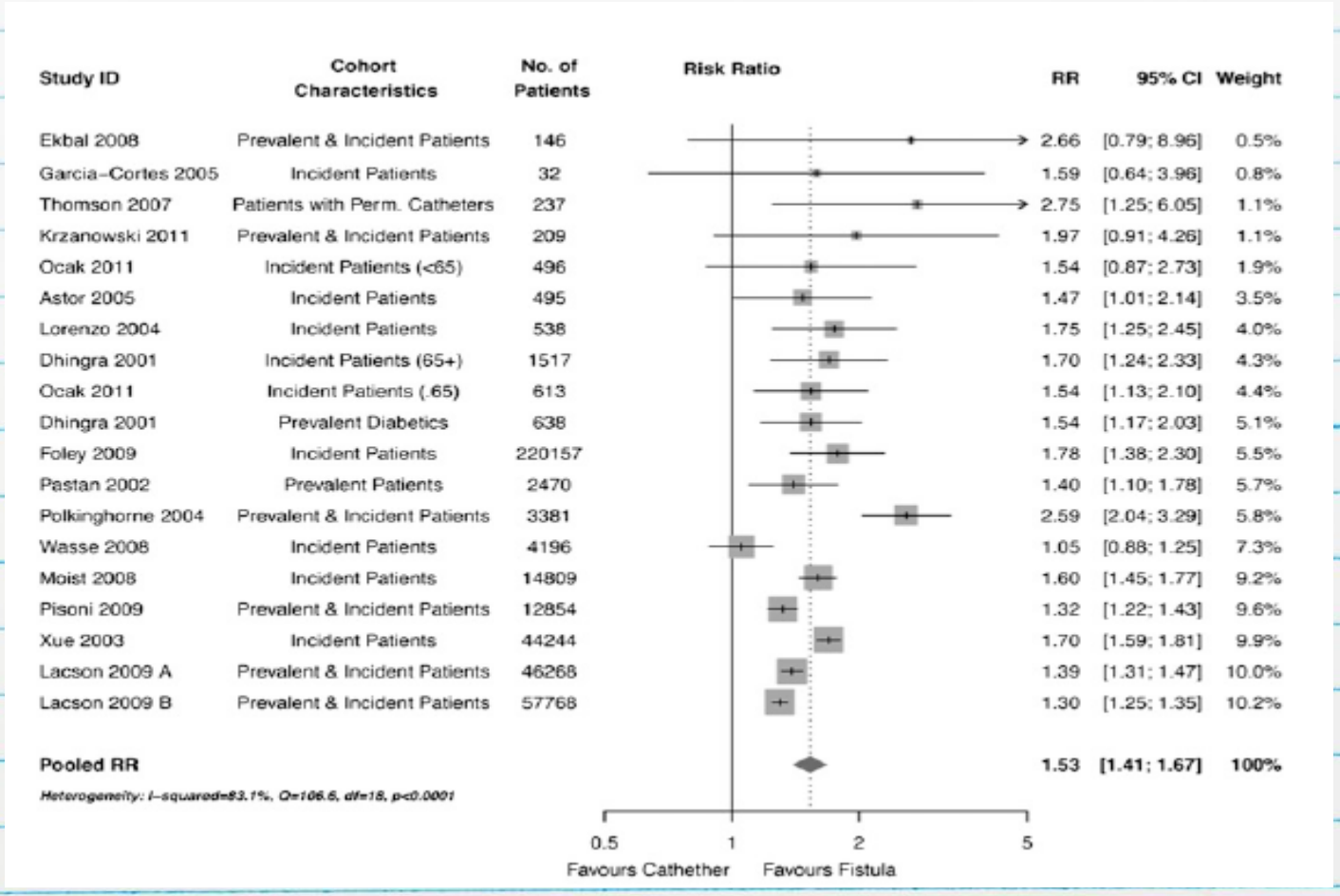
No randomized trials to evaluate the benefits and harms of HD access strategies or the clinical practices and policies

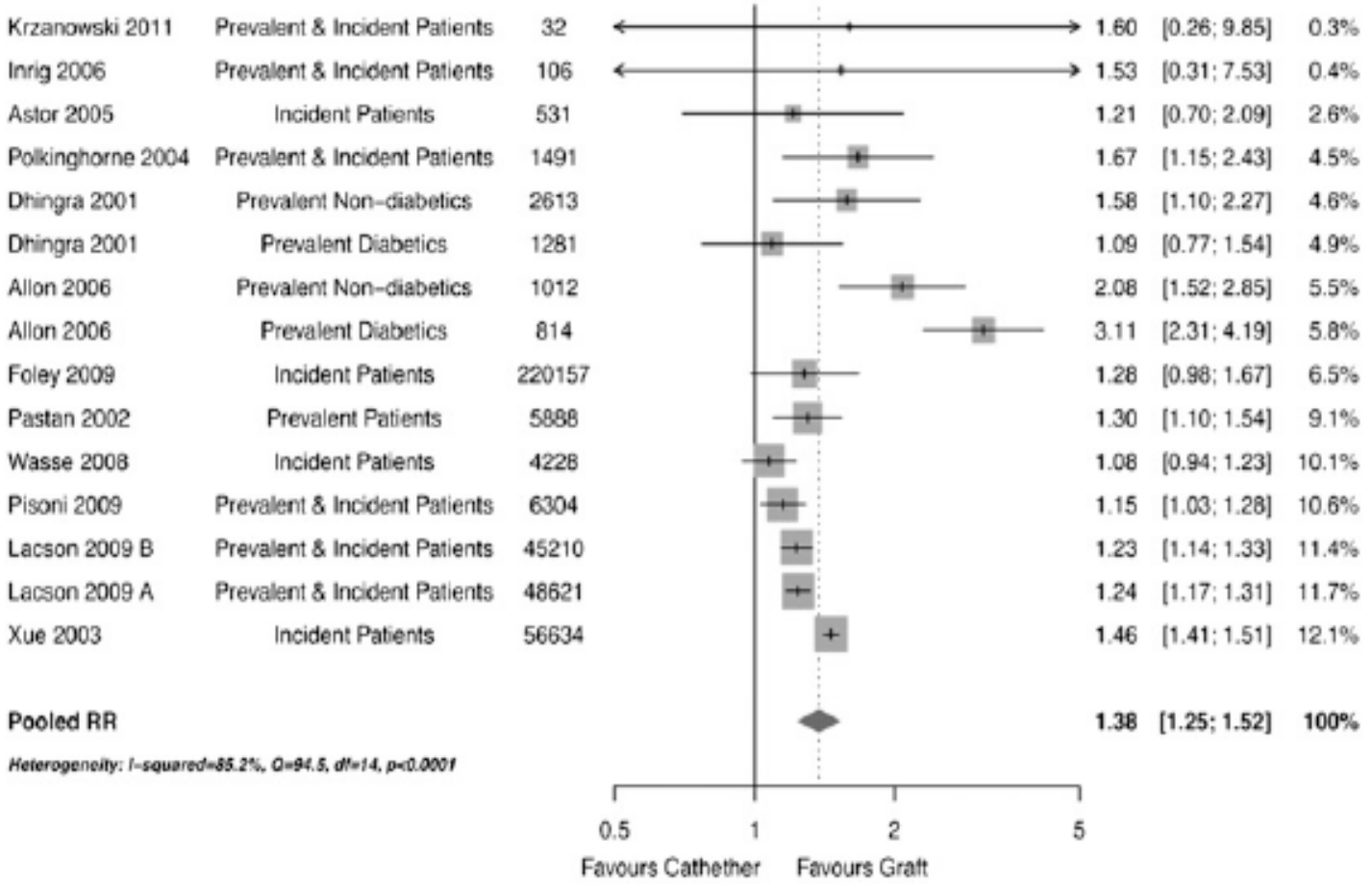
CLINICAL EPIDEMIOLOGY www.jasn.org

Associations between Hemodialysis Access Type and Clinical Outcomes: A Systematic Review

Pietro Ravani,*†‡ Suetonia C. Palmer,§ Matthew J. Oliver,‖ Robert R. Quinn,*†‡ Jennifer M. MacRae,* Davina J. Tai,*¶ Neesh I. Pannu,** Chandra Thomas,* Brenda R. Hemmelgarn,*†‡ Jonathan C. Craig,†††‡‡§§ Braden Manns,*†‡ Marcello Tonelli,** Giovanni F.M. Strippoli,‡‡§§‖‖¶¶ and Matthew T. James*†‡

J Am Soc Nephrol 24: 465–473, 2013. doi: 10.1681/ASN.2012070643


Study ID
Cohort Characteristics
No. of Patients
Risk Ratio
RR
95% CI
Weight
Ekbal 2008 Prevalent & Incident Patients 146 2.66 [0.79; 8.96] 0.5%
Garcia-Cortes 2005 Incident Patients 32 1.59 [0.64; 3.96] 0.8%
Thomson 2007 Patients with Perm. Catheters 237 2.75 [1.25; 6.05] 1.1%
Krzanowski 2011 Prevalent & Incident Patients 209 1.97 [0.91; 4.26] 1.1%
Ocak 2011 Incident Patients (<65) 496 1.54 [0.87; 2.73] 1.9%
Astor 2005 Incident Patients 495 1.47 [1.01; 2.14] 3.5%
Lorenzo 2004 Incident Patients 538 1.75 [1.25; 2.45] 4.0%
Dhingra 2001 Incident Patients (65+) 1517 1.70 [1.24; 2.33] 4.3%
Ocak 2011 Incident Patients (.65) 613 1.54 [1.13; 2.10] 4.4%
Dhingra 2001 Prevalent Diabetics 638 1.54 [1.17; 2.03] 5.1%
Foley 2009 Incident Patients 220157 1.78 [1.38; 2.30] 5.5%
Pastan 2002 Prevalent Patients 2470 1.40 [1.10; 1.78] 5.7%
Polkinghorne 2004 Prevalent & Incident Patients 3381 2.59 [2.04; 3.29] 5.8%
Wasse 2008 Incident Patients 4196 1.05 [0.88; 1.25] 7.3%
Moist 2008 Incident Patients 14809 1.60 [1.45; 1.77] 9.2%
Pisoni 2009 Prevalent & Incident Patients 12854 1.32 [1.22; 1.43] 9.6%
Xue 2003 Incident Patients 44244 1.70 [1.59; 1.81] 9.9%
Lacson 2009 A Prevalent & Incident Patients 46268 1.39 [1.31; 1.47] 10.0%
Lacson 2009 B Prevalent & Incident Patients 57768 1.30 [1.25; 1.35] 10.2%
Pooled RR 1.53 [1.41; 1.67] 100%
Heterogeneity: I-squared=83.1%, Q=106.6, df=18, p<0.0001
0.5
1
2
5
Favours Cathether
Favours Fistula


Krzanowski 2011 Prevalent & Incident Patients 32 1.60 [0.26; 9.85] 0.3%
Inrig 2006 Prevalent & Incident Patients 106 1.53 [0.31; 7.53] 0.4%
Astor 2005 Incident Patients 531 1.21 [0.70; 2.09] 2.6%
Polkinghorne 2004 Prevalent & Incident Patients 1491 1.67 [1.15; 2.43] 4.5%
Dhingra 2001 Prevalent Non-diabetics 2613 1.58 [1.10; 2.27] 4.6%
Dhingra 2001 Prevalent Diabetics 1281 1.09 [0.77; 1.54] 4.9%
Allon 2006 Prevalent Non-diabetics 1012 2.08 [1.52; 2.85] 5.5%
Allon 2006 Prevalent Diabetics 814 3.11 [2.31; 4.19] 5.8%
Foley 2009 Incident Patients 220157 1.28 [0.98; 1.67] 6.5%
Pastan 2002 Prevalent Patients 5888 1.30 [1.10; 1.54] 9.1%
Wasse 2008 Incident Patients 4228 1.08 [0.94; 1.23] 10.1%
Pisoni 2009 Prevalent & Incident Patients 6304 1.15 [1.03; 1.28] 10.6%
Lacson 2009 B Prevalent & Incident Patients 45210 1.23 [1.14; 1.33] 11.4%
Lacson 2009 A Prevalent & Incident Patients 48621 1.24 [1.17; 1.31] 11.7%
Xue 2003 Incident Patients 56634 1.46 [1.41; 1.51] 12.1%
Pooled RR 1.38 [1.25; 1.52] 100%
Heterogeneity: I-squared=85.2%, Q=94.5, df=14, p<0.0001
0.5
1
2
5
Favours Cathether
Favours Graft

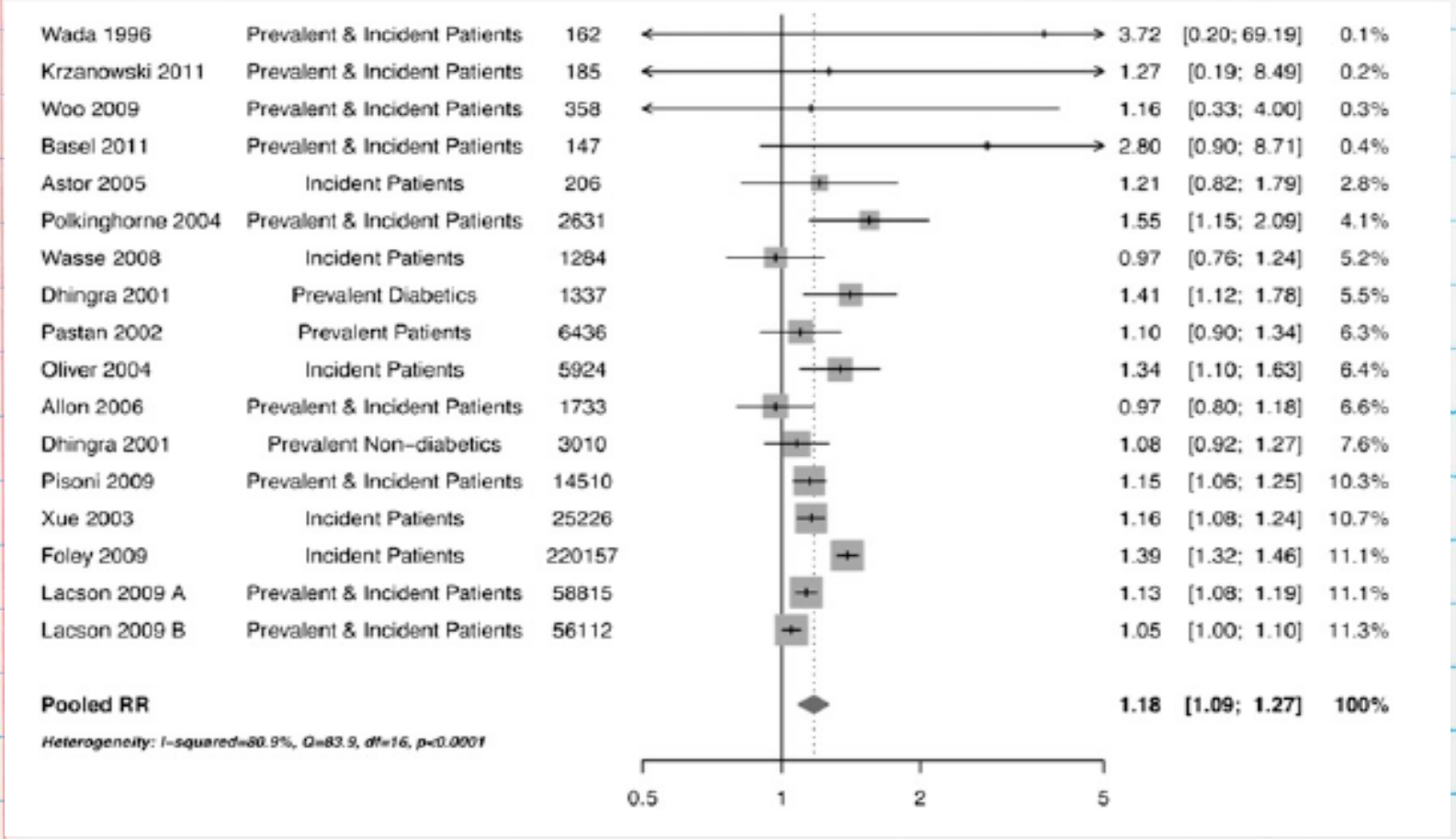

Wada 1996 Prevalent & Incident Patients 162 3.72 [0.20; 69.19] 0.1%
Krzanowski 2011 Prevalent & Incident Patients 185 1.27 [0.19; 8.49] 0.2%
Woo 2009 Prevalent & Incident Patients 358 1.16 [0.33; 4.00] 0.3%
Basel 2011 Prevalent & Incident Patients 147 2.80 [0.90; 8.71] 0.4%
Astor 2005 Incident Patients 206 1.21 [0.82; 1.79] 2.8%
Polkinghorne 2004 Prevalent & Incident Patients 2631 1.55 [1.15; 2.09] 4.1%
Wasse 2008 Incident Patients 1284 0.97 [0.76; 1.24] 5.2%
Dhingra 2001 Prevalent Diabetics 1337 1.41 [1.12; 1.78] 5.5%
Pastan 2002 Prevalent Patients 6436 1.10 [0.90; 1.34] 6.3%
Oliver 2004 Incident Patients 5924 1.34 [1.10; 1.63] 6.4%
Allon 2006 Prevalent & Incident Patients 1733 0.97 [0.80; 1.18] 6.6%
Dhingra 2001 Prevalent Non-diabetics 3010 1.08 [0.92; 1.27] 7.6%
Pisoni 2009 Prevalent & Incident Patients 14510 1.15 [1.06; 1.25] 10.3%
Xue 2003 Incident Patients 25226 1.16 [1.08; 1.24] 10.7%
Foley 2009 Incident Patients 220157 1.39 [1.32; 1.46] 11.1%
Lacson 2009 A Prevalent & Incident Patients 58815 1.13 [1.08; 1.19] 11.1%
Lacson 2009 B Prevalent & Incident Patients 56112 1.05 [1.00; 1.10] 11.3%
Pooled RR 1.18 [1.09; 1.27] 100%
Heterogeneity: I-squared=80.9%, Q=83.9, df=16, p<0.0001
0.5
1
2
5

Table 2. Incidence of catheter-related bacteremia (CRB) in hemodialysis patients

Source [reference]	Country	Year	*N*	Incidence of CRB per 1000 catheter-days	% CRB due to gram-positive cocci
Moss et al. [28]	USA	1990	131	0.7	N/A
Marr et al. [29]	USA	1997	102	3.9	63%
Kairaitis and Gottlieb [21]	Australia	1999	105	6.5	100%
Beathard [30]	USA	1999	387	3.4	84.5%[b]
Saad [31]	USA	1999	101	5.5	67.4%[c]
Cuevas et al (abstract)[a]	Spain	1999	189	1.54	84%
Cuevas et al (abstract)	Spain	1999	45	1	84%

N denotes number of patients with hemodialysis catheters; N/A denotes data not available.
[a]A study on temporary dialysis catheters
[b]Includes 9.8% of cultures due to mixed gram-positive and gram-negative infections
[c]Includes 12.8% cultures with mixed gram-positive and gram-negative infections

Kidney International, Vol. 60 (2001), pp. 1–13

PERSPECTIVES IN RENAL MEDICINE

Infectious complications of the hemodialysis access

George M. Nassar and Juan Carlos Ayus

Baylor College of Medicine, Houston, Texas, USA

Powe NR, Jaar B, Furth SL, *et al:* Septicemia in dialysis patients: Incidence, risk factors, and prognosis. *Kidney Int* 55:1081–1090, 1999

Hung KY, Tsai TJ, Yen CJ, Yen TS: Infection associated with double lumen catheterization for temporary haemodialysis: Experience of 168 cases. *Nephrol Dial Transplant* 10:247–251, 1995

Moss AH, Vasilakis C, Holley JL, *et al:* Use of a silicone dual-lumen catheter with a Dacron cuff as a long-term vascular access for hemodialysis patients. *Am J Kidney Dis* 16:211–215, 1990

a large seven-year longitudinal study of 4005 incident ESRD patients in the case-mix study of the USRDS, Powe et al found temporary vascular access as an independent risk factor for septicemia [7]. Hung et al studied 168 tem-

21.4% of cases. The cumulative probability of patients remaining free from CRB was 75% by the end of four weeks and less than 50% near the end of the second month [26]. A similar increase in the risk of developing

Earlier reports described lower infection rates with tunneled cuffed catheters as opposed to nontunneled double lumen catheters [27, 28]; however, this has not been subjected to confirmation by large randomized trials. In 1988, Schwab et al observed one CRB among 80

A recent prospective study involving 234 HD catheters (45 of which were tunneled), presented by investigators from Spain (abstract; Cuevas et al, *J Am Soc Nephrol* 10:204, 1999), found CRB to occur at similar rates among tunneled and nontunneled catheters (1 per 1000 catheter-days with tunneled catheters vs. 1.54 per 1000 catheter-days with nontunneled catheters, $P = 0.98$). However, the average time from catheter placement to infection was longer with tunneled catheters (66.2 ± 84.5 days vs. 20.6 ± 29.4 days).

An APIC Guide

2010

Guide to the Elimination of Infections in Hemodialysis

About APIC

APIC's mission is to improve health and patient safety by reducing risks of infection and other adverse outcomes. The Association's more than 12,000 members have primary responsibility for infection prevention, control, and hospital epidemiology in healthcare settings around the globe. APIC's members are nurses, epidemiologists, physicians, microbiologists, clinical pathologists, laboratory technologists, and public health professionals. APIC advances its mission through education, research, consultation, collaboration, public policy, practice guidance, and credentialing.

Financial Support for the Distribution of This Guide Provided by Professional Disposables International, Inc. In the Form of an Unrestricted Educational Grant

Guidelines for the Prevention of Intravascular Catheter-Related Infections, 2011

Naomi P. O'Grady, M.D.[1], Mary Alexander, R.N.[2], Lillian A. Burns, M.T., M.P.H., C.I.C.[3], E. Patchen Dellinger, M.D.[4], Jeffery Garland, M.D., S.M.[5], Stephen O. Heard, M.D.[6], Pamela A. Lipsett, M.D.[7], Henry Masur, M.D.[1], Leonard A. Mermel, D.O., Sc.M.[8], Michele L. Pearson, M.D.[9], Issam I. Raad, M.D.[10], Adrienne Randolph, M.D., M.Sc.[11], Mark E. Rupp, M.D.[12], Sanjay Saint, M.D., M.P.H.[13] and the Healthcare Infection Control Practices Advisory Committee (HICPAC)[14].

1National Institutes of Health, Bethesda, Maryland
2Infusion Nurses Society, Norwood, Massachusetts
3Greenich Hospital, Greenwich, Connecticut
4University of Washington, Seattle, Washington
5Wheaton Franciscan Healthcare-St. Joseph, Milwaukee, Wisconsin
6 University of Massachusetts Medical School, Worcester, Massachusetts
7Johns Hopkins University School of Medicine, Baltimore, Maryland
8Warren Alpert Medical School of Brown University and Rhode Island Hospital, Providence, Rhode Island
9Office of Infectious Diseases, CDC, Atlanta, Georgia
10MD Anderson Cancer Center, Houston, Texas
11The Children's Hospital, Boston, Massachusetts
12University of Nebraska Medical Center, Omaha, Nebraska
13Ann Arbor VA Medical Center and University of Michigan, Ann Arbor, Michigan

A Patient's Story

- 22-year old hemodialysis patient
- Central venous access port became infected
- Healthcare workers tried to eliminate my infection for several weeks using antibiotics
- Ultimately my central venous access port had to be removed to clear the infection

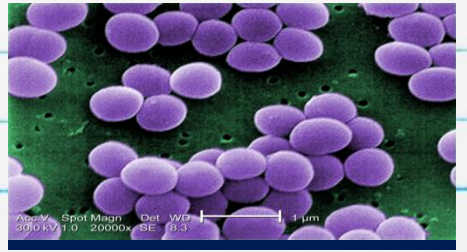
Photo provided by Brian Hess, used with permission

Why are Dialysis Patients at Risk for Infection?

- Patients who undergo hemodialysis have a higher risk of infection, due to the following factors:
  - Frequent use of catheters or insertion of needles to access the bloodstream
  - Weakened immune systems
  - Frequent hospital stays and surgery

Infections in Dialysis Patients

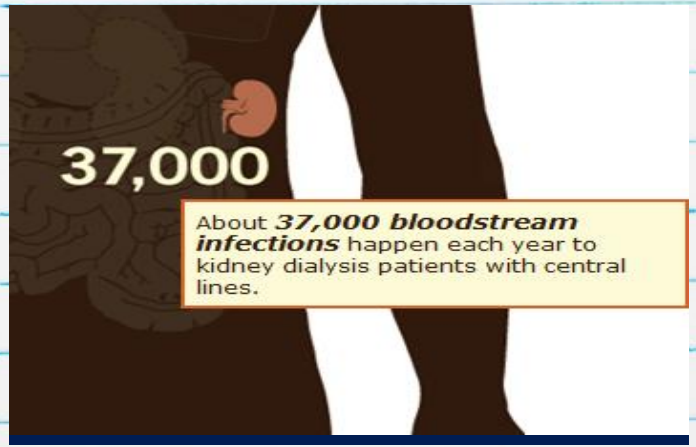
- **Bloodstream infections** are a dangerous complication of dialysis
- 1 in 4 patients who get a bloodstream infection caused by *S. aureus* (staph) bacteria can face complications such as:
  - Endocarditis (infected heart valve)
  - Osteomyelitis (infected bone)



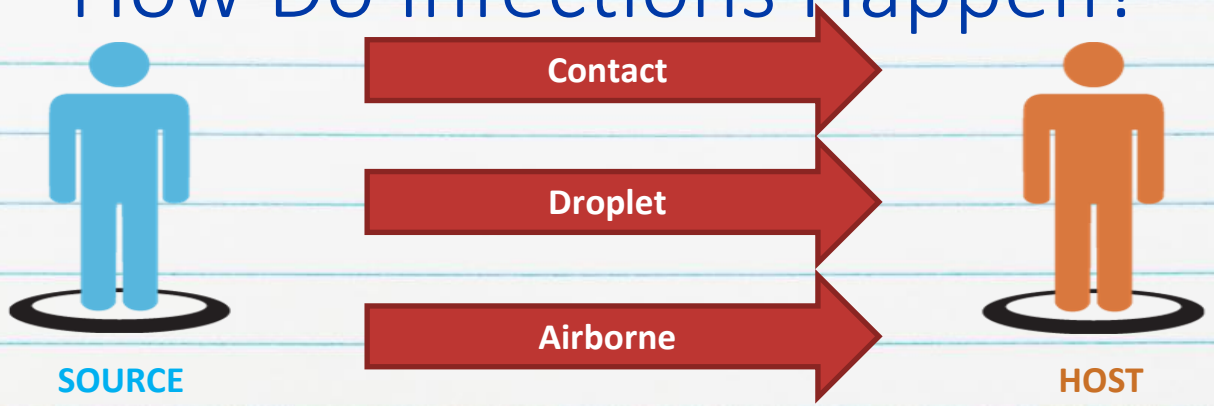
- Total costs for each infection can be more than $20,000
- Bloodstream infections can cause sepsis (a potentially deadly condition)
- Up to 1 in 5 patients with an infection die within 12 weeks

National Burden of Dialysis Infections
A Cause for Concern

- In the US, there are about 370,000 people relying on hemodialysis
- About 75,000 people receive hemodialysis through a central line
- Central lines have a higher risk of infection than a fistula or graft
- CDC estimates 37,000 central line-associated bloodstream infections may have occurred in U.S. hemodialysis patients in 2008



How Do Infections Happen?



Three elements must be present for an infection to occur:

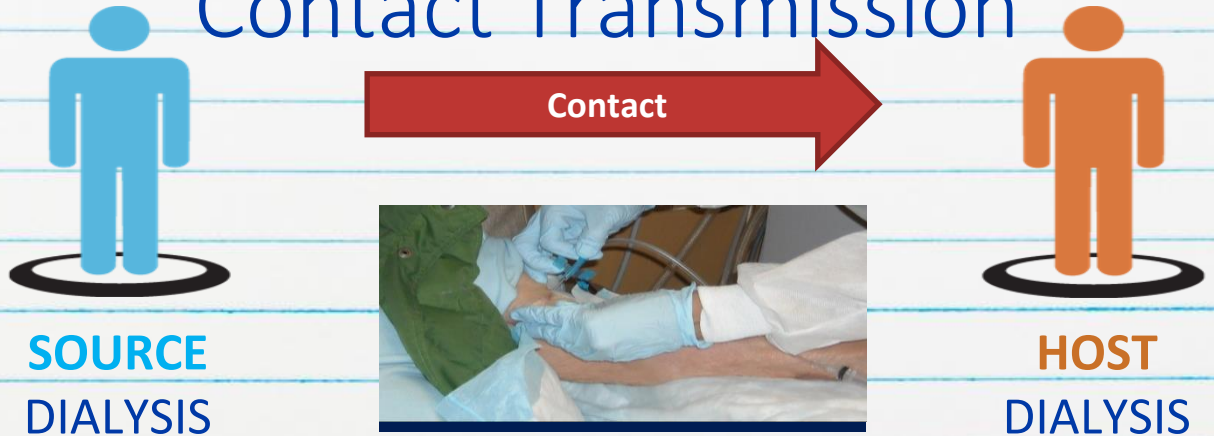
1.A ***source*** of germs (like bacteria or viruses)

2.A susceptible ***host***, meaning a person who is at risk of getting an infection from the germs

3.A ***way*** for the germs to move from the source to the host

- There are three ways in which germs move from the source to the host: ***Contact, Droplet, and Airborne Transmission***

Your Role in Contact Transmission



- During dialysis, infections can be spread by Contact Transmission
- Most commonly by **healthcare worker hands!**

Basic Steps in Catheter Care

Catheter Connection Procedure:

1. Perform hand hygiene
2. Put on a new, clean pair of gloves
3. Wear proper face protection
4. Apply antiseptic to catheter hub and allow it to dry
5. Connect the catheter to blood lines using aseptic technique
6. Unclamp the catheter
7. Remove gloves and perform hand hygiene

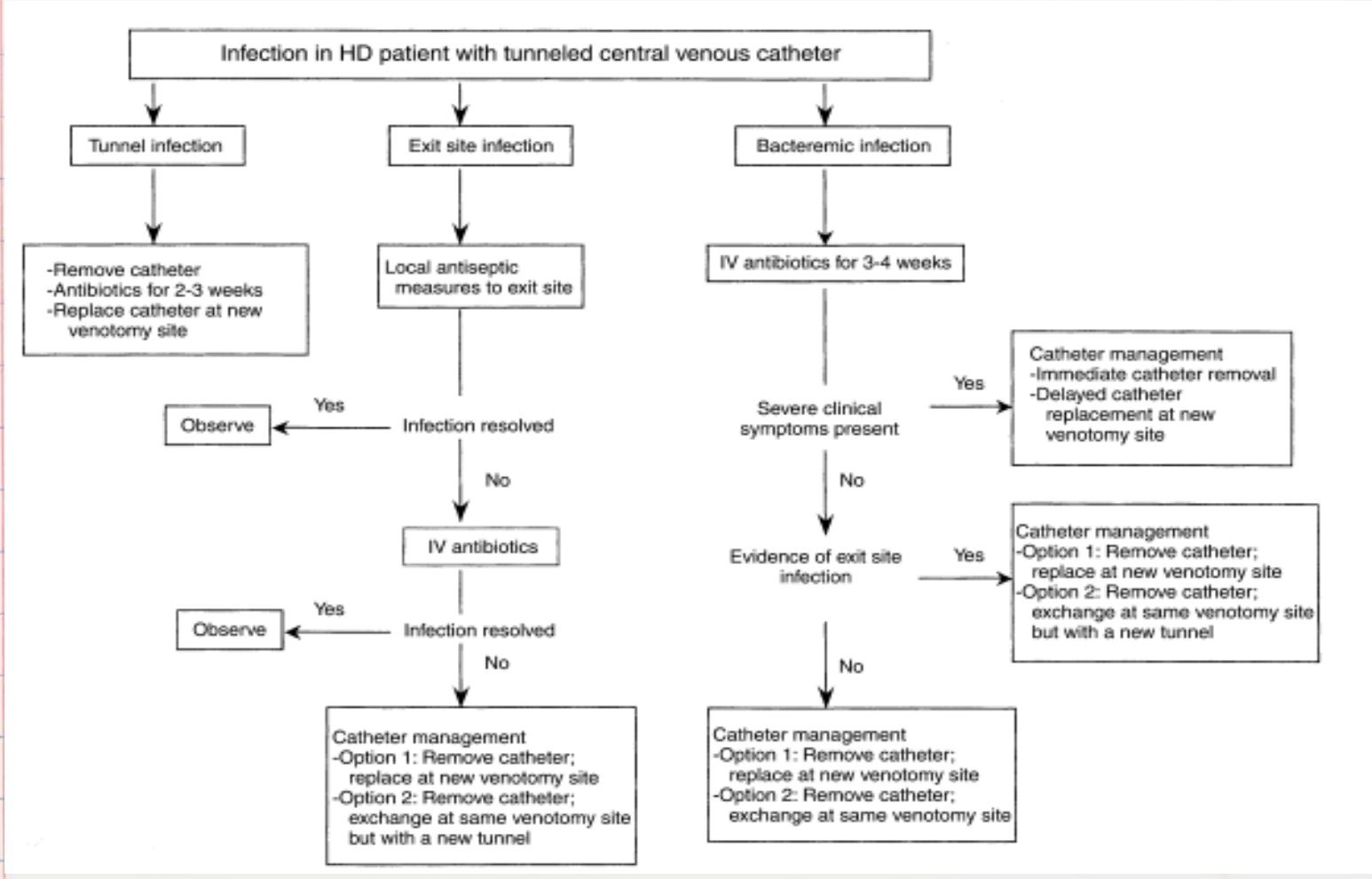
Basic Steps in Catheter Care

Catheter Disconnection Procedure:

1. Perform hand hygiene
2. Put on a new, clean pair of gloves
3. Wear proper face protection
4. Disconnect the catheter from blood lines using aseptic technique
5. Apply antiseptic to catheter hub and allow it to dry
6. Replace caps using aseptic technique
7. Make sure the catheter remains clamped
8. Remove gloves and perform hand hygiene

Catheter Exit Site Care

1. Perform hand hygiene
2. Put on a new, clean pair of gloves
3. Wear a face mask if required
4. Apply antiseptic to catheter exit site and allow it to dry
5. Apply antimicrobial ointment
6. Apply clean dressing to exit site
7. Remove gloves and perform hand hygiene


Infection in HD patient with tunneled central venous catheter
Tunnel infection
Exit site infection
Bacteremic infection
-Remove catheter
-Antibiotics for 2-3 weeks
-Replace catheter at new venotomy site
Local antiseptic measures to exit site
IV antibiotics for 3-4 weeks
Yes
Observe
Infection resolved
No
IV antibiotics
Yes
Observe
Infection resolved
No
Catheter management
-Option 1: Remove catheter; replace at new venotomy site
-Option 2: Remove catheter; exchange at same venotomy site but with a new tunnel
Severe clinical symptoms present
Yes
Catheter management
-Immediate catheter removal
-Delayed catheter replacement at new venotomy site
No
Evidence of exit site infection
Yes
Catheter management
-Option 1: Remove catheter; replace at new venotomy site
-Option 2: Remove catheter; exchange at same venotomy site but with a new tunnel
No
Catheter management
-Option 1: Remove catheter; replace at new venotomy site
-Option 2: Remove catheter; exchange at same venotomy site

INFECTIONS OF THE ARTERIOVENOUS ACCESS

Arteriovenous fistula versus graft

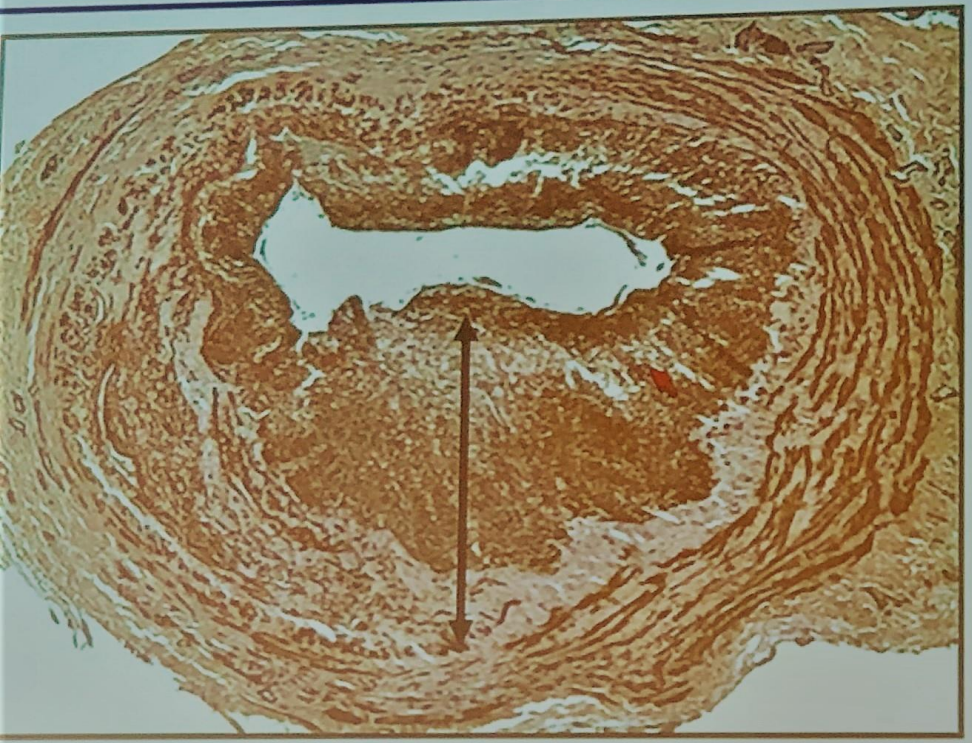
grafts [6, 9, 14, 19, 47]. Postoperative wound infection as well as poor aseptic technique at dialysis may cause infection of the fistula. In most instances, such infections are successfully managed by systemic antibiotics and conservative surgery, but can lead to loss of the fistula [47].

FONG IW, CAPELLAN JM, SIMBUL M, ANGEL J: Infection of arteriovenous fistulas created for chronic haemodialysis. *Scand J Infect Dis* 25:215–220, 1993

A considerable risk of PTFE graft infection is posed by the need for repetitive cannulation of the graft for dialytic purposes [50]. Difficulty in cannulation of the PTFE graft, perigraft hematoma formation, prolonged postdialysis bleeding from the graft, and a break in the sterile technique further increase the likelihood of PTFE graft infection at needle puncture sites. Bonomo et al found surgical manipulation to be a risk factor for graft infection [19].

BONOMO RA, RICE D, WHALEN C, *et al:* Risk factors associated with permanent access-site infections in chronic hemodialysis patients. *Infect Control Hosp Epidemiol* 18:757–761, 1997

Histological presentation of dialysis vascular access dysfunction



- Aggressive neointimal hyperplasia
- Smooth muscle cells, myofibroblasts and fibroblasts
- Migrated in from the media and perhaps the adventitia
- Response to hemodynamic stress and surgical injury
- Likely exaggerated by the inflammation, oxidative stress and endothelial dysfunction that characterizes uremia
- Combination of neointimal hyperplasia with inward/negative remodeling or a lack of positive/outward remodeling

INFECTIONS OF THE ARTERIOVENOUS ACCESS

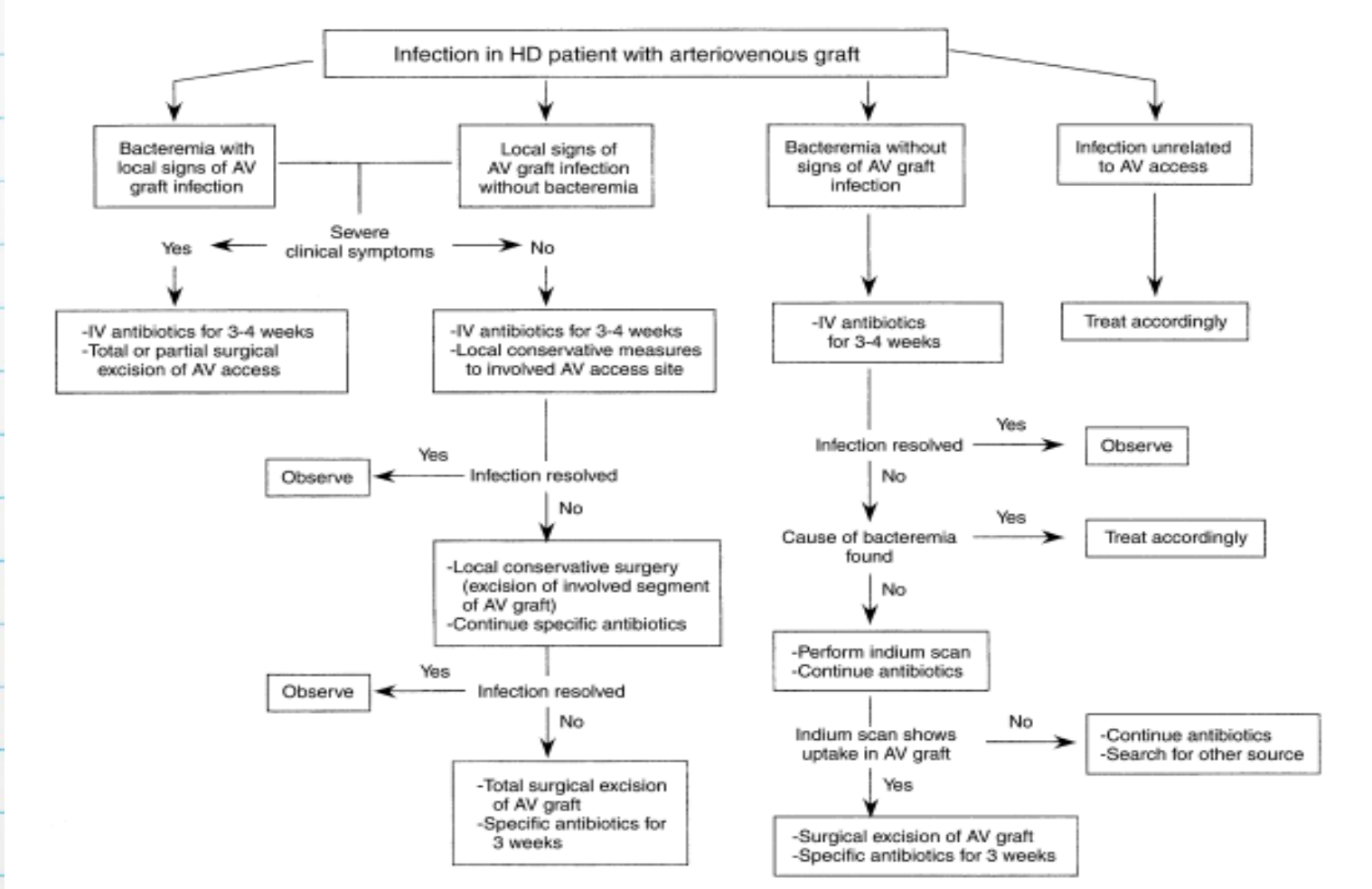
Arteriovenous fistula versus graft

The risk of PTFE infection starts at the time of surgical placement. Zibari et al reported an initial 30-day graft infection rate of 6% in 208 patients undergoing PTFE placement [49]. The femoral location (thigh graft) of PTFE

ZIBARI GB, GADALLAH MR, LANDRENEAU M, *et al:* Preoperative vancomycin prophylaxis decreases incidence of postoperative hemodialysis vascular access infections. *Am J Kidney Dis* 30:343–348, 1997

Infection of PTFE graft material may also develop as a result of a transient bacteremia caused by an infection at a distant site [19]. Central venous catheters are notori-

BONOMO RA, RICE D, WHALEN C, *et al:* Risk factors associated with permanent access-site infections in chronic hemodialysis patients. *Infect Control Hosp Epidemiol* 18:757–761, 1997


Infection in HD patient with arteriovenous graft
Bacteremia with local signs of AV graft infection
Local signs of AV graft infection without bacteremia
Bacteremia without signs of AV graft infection
Infection unrelated to AV access
Severe clinical symptoms
Yes
No
-IV antibiotics for 3-4 weeks
-Total or partial surgical excision of AV access
-IV antibiotics for 3-4 weeks
-Local conservative measures to involved AV access site
-IV antibiotics for 3-4 weeks
Treat accordingly
Infection resolved
Yes
Observe
No
-Local conservative surgery (excision of involved segment of AV graft)
-Continue specific antibiotics
Infection resolved
Yes
Observe
No
-Total surgical excision of AV graft
-Specific antibiotics for 3 weeks
Infection resolved
Yes
Observe
No
Cause of bacteremia found
Yes
Treat accordingly
No
-Perform indium scan
-Continue antibiotics
Indium scan shows uptake in AV graft
No
-Continue antibiotics
-Search for other source
Yes
-Surgical excision of AV graft
-Specific antibiotics for 3 weeks

INFECTIONS OF OLD CLOTTED ARTERIOVENOUS GRAFTS

Table 3. Risk factors for arteriovenous graft infection

Diabetes mellitus
Immuno-incompetency
Renal transplantation
Indwelling central venous catheter
History of bacteremia
Previous major infection in any organ system
Previous arteriovenous graft-related infection
Previous arteriovenous graft-related surgery
Fever of unknown origin

Basic Steps in Fistula/Graft Care

Cannulation Procedure:

1. Wash the site
2. Perform hand hygiene
3. Put on a new, clean pair of gloves
4. Wear proper face protection
5. Apply skin antiseptic and allow it to dry
6. Insert needle using aseptic technique
7. Remove gloves and perform hand hygiene

Aseptic technique *means ta*king great care to not contaminate the fistula or *graft site before or during the cannulation or decannulation procedure*

Basic Steps in Fistula/Graft Care

Decannulation Procedure:

1. Perform hand hygiene
2. Put on a new, clean pair of gloves
3. Wear proper face protection
4. Remove needles using aseptic technique
5. Apply clean gauze/bandage to site
6. Compress the site with clean gloves
7. Remove gloves and perform hand hygiene

Complications of bacteremia

Infectious complications of bacteremia are a frequent occurrence in HD patients. Death, recurrence of bacteremia, endocarditis, epidural abscess, purulent pericarditis, septic arthritis, septic pulmonary emboli, liver abscess, and endophthalmia have all been reported as complications of bacteremia [8, 14–16]. By far, the leading bacterial isolate in HD patients with metastatic complications is *S. aureus* [8, 14–16]. Infectious endocarditis

Peacock SJ, Curtis N, Berendt AR, *et al:* Outcome following haemodialysis catheter-related *Staphylococcus aureus* bacteraemia. *J Hosp Infect* 41:223–228, 1999

Infective Endocarditis in Patients with ESKD

Danish National Registry on Regular Dialysis and Transplantation
(1996-2012)

N=10,612

- 63 years old
- 36% female
- 25% DM
- 7% with valvular heart disease

Hemodialysis
N= 7,233

Peritoneal dialysis
N= 3,056

Preemptive kidney transplant
N= 323

	267 first-time endocarditis events	Adjusted HR (vs PD)
Hemodialysis	1,092/100,000 patient years	5.46
Uncuffed CVC		14.10
Cuffed CVC		10.03
AVF		4.59
Peritoneal dialysis	212/100,000 patient years	Reference
Preemptive kidney transplant	85/100,000 patient years	0.41

RISK FACTORS

- Central venous catheter
- First 6 months of RRT
- Aortic valve disease
- Previous endocarditis

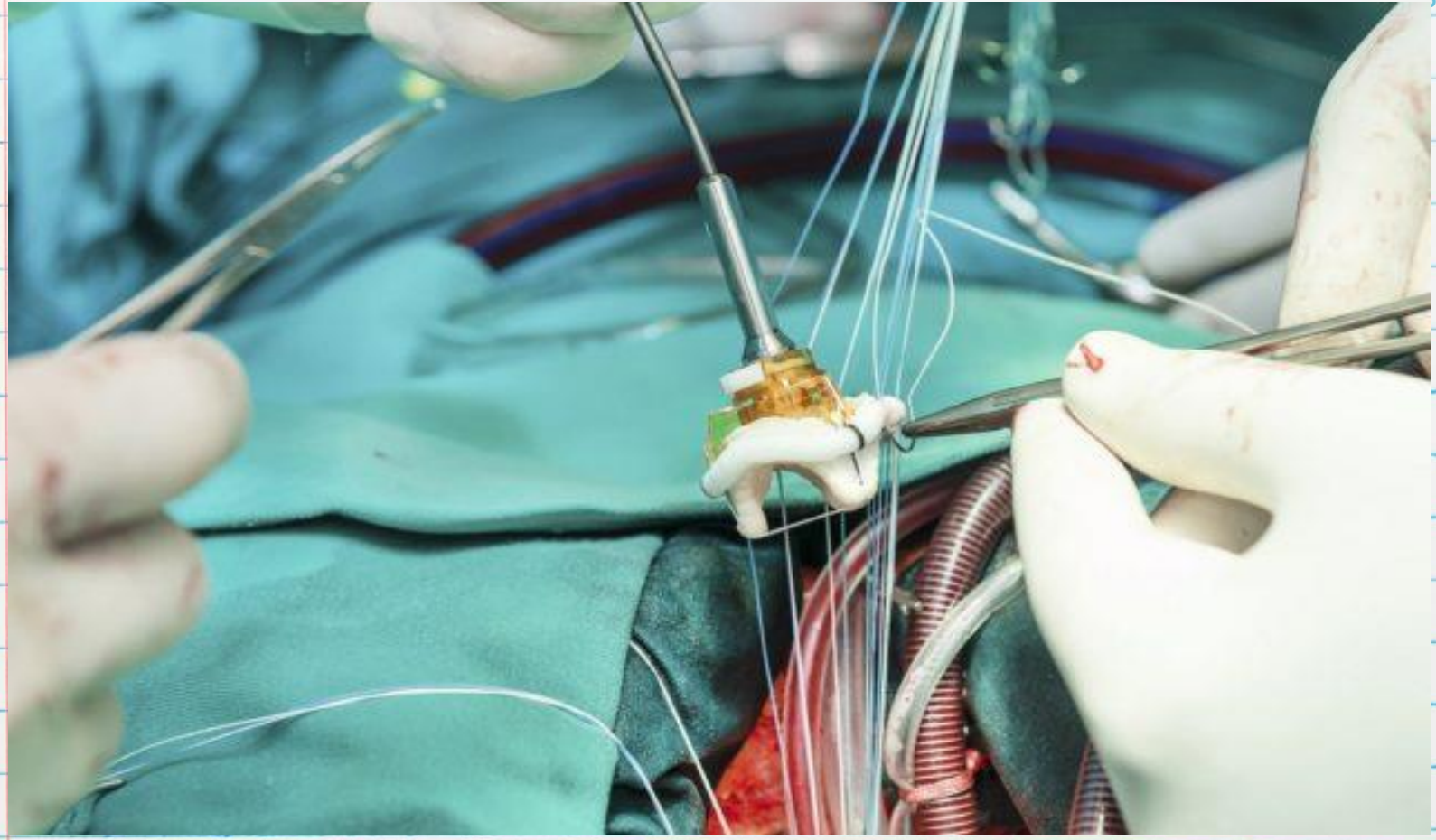
MORTALITY
from endocarditis

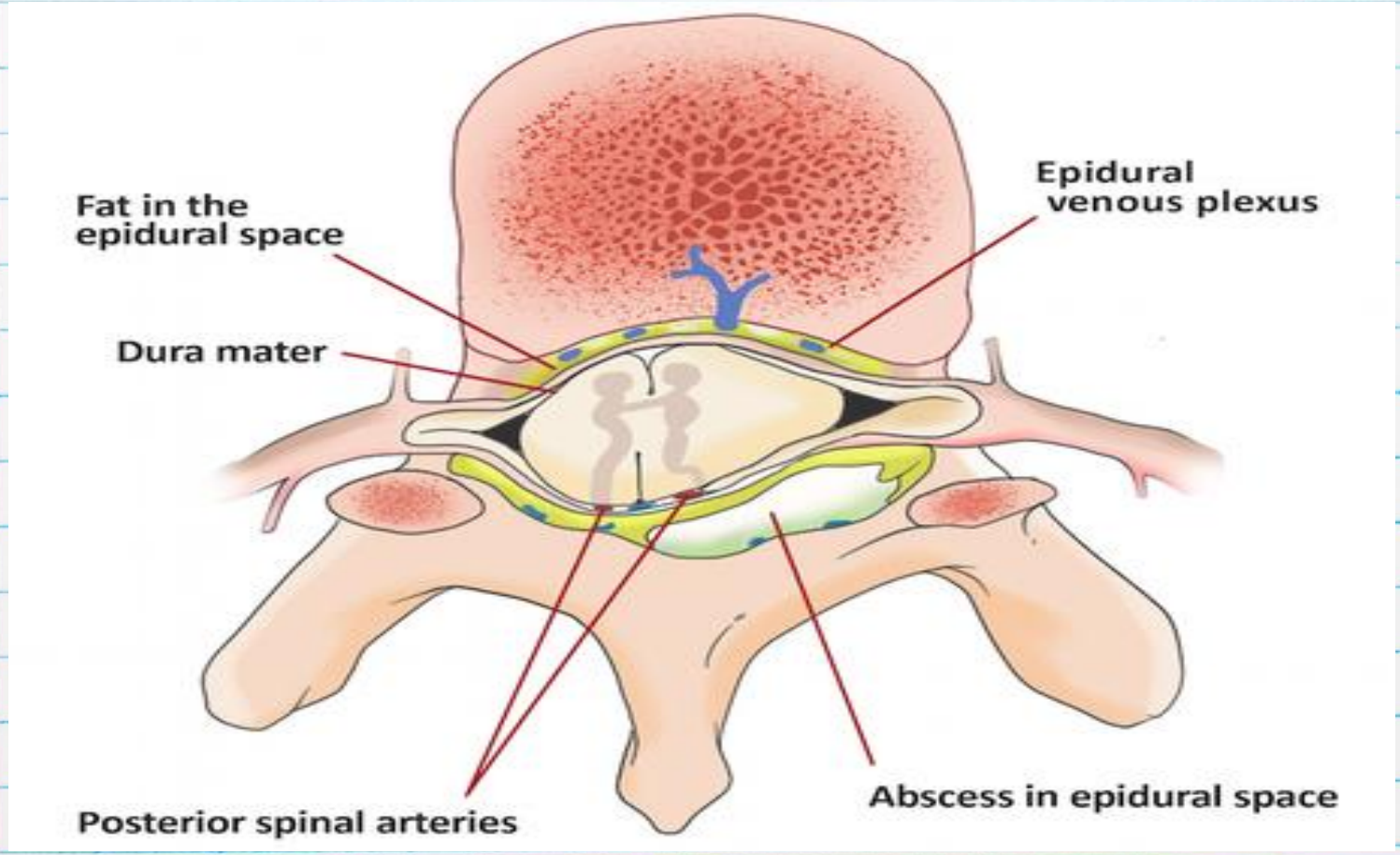
22% in-house
51% at 1-year

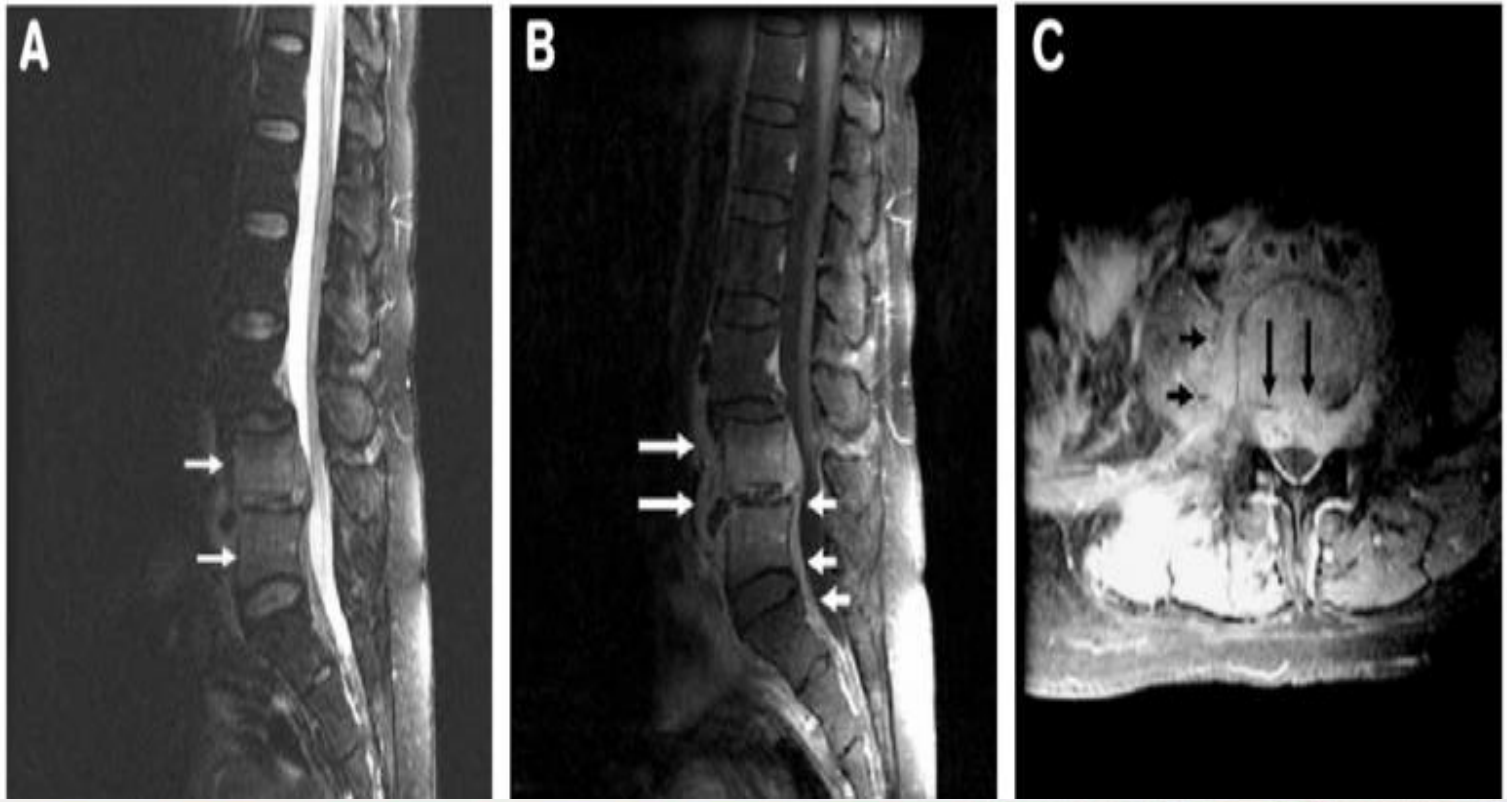
CONCLUSIONS Incidence rate of infective endocarditis was highest in HD, particularly with CVCs. The first 6 months in renal replacement therapy, aortic valve disease and previous endocarditis were independent risk factors.

doi:10.2215/CJN.02320317

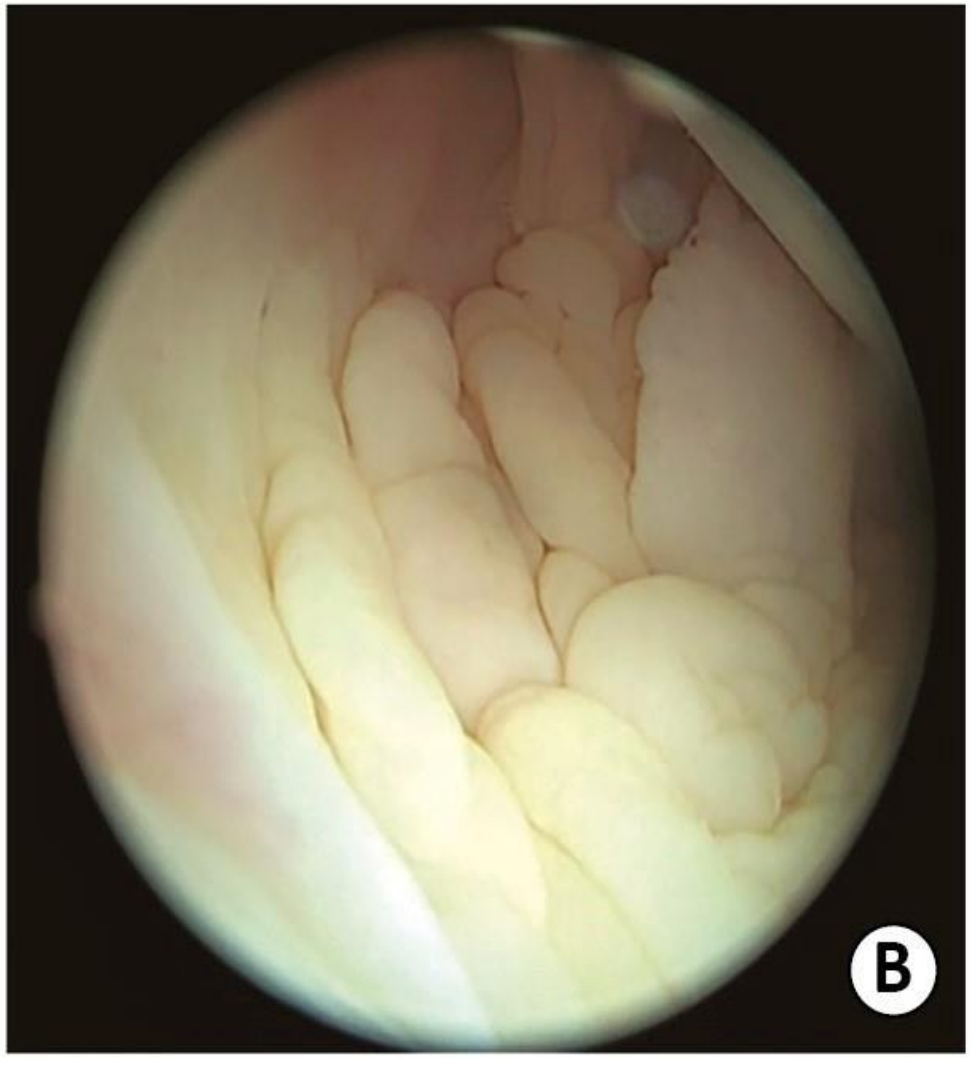
CJASN
Clinical Journal of American Society of Nephrology




Fat in the epidural space
Epidural venous plexus
Dura mater
Posterior spinal arteries
Abscess in epidural space


A
B
C


A


B

Multidrug-resistant Organisms (MDRO)

- 1. Methicillin-resistant *Staphylococcus aureus*
- 2. Vancomycin-resistant enterococci
- 3. Multidrug-resistant gram-negative bacteria

Impact of MDRO infections

- ~ 700,000 deaths annually due to MDRO infections
- by 2050, estimated 10 million deaths, outpacing cancer, diabetes, diarrheal disease and automobile accidents
- overuse of antimicrobials main risk factor for acquisition and spread of MDRO

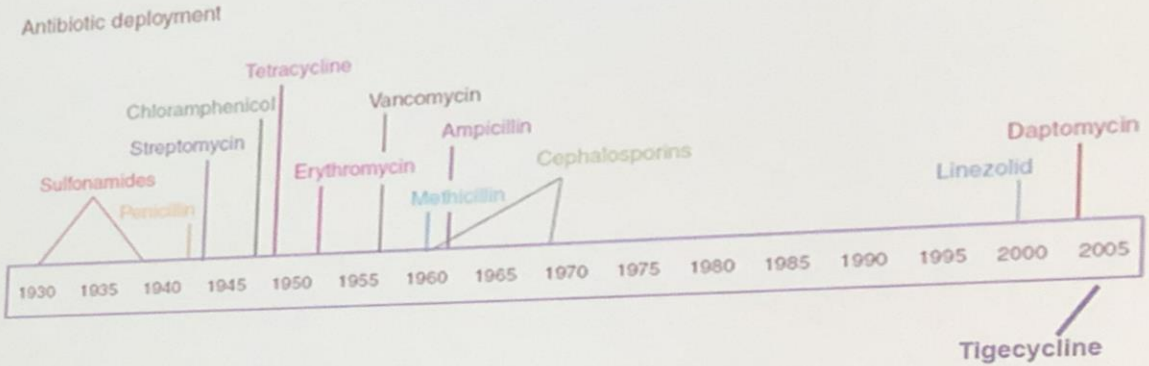
Prevalence of multidrug-resistant organisms among maintenance hemodialysis patients

- MRSA
  - 6-28% colonized
  - Colonization is a prerequisite for subsequent infection
  - Risk of invasive MRSA infection 100-fold higher than general population
- VRE
  - 9-18% colonized

Population of Maintenance Hemodialysis

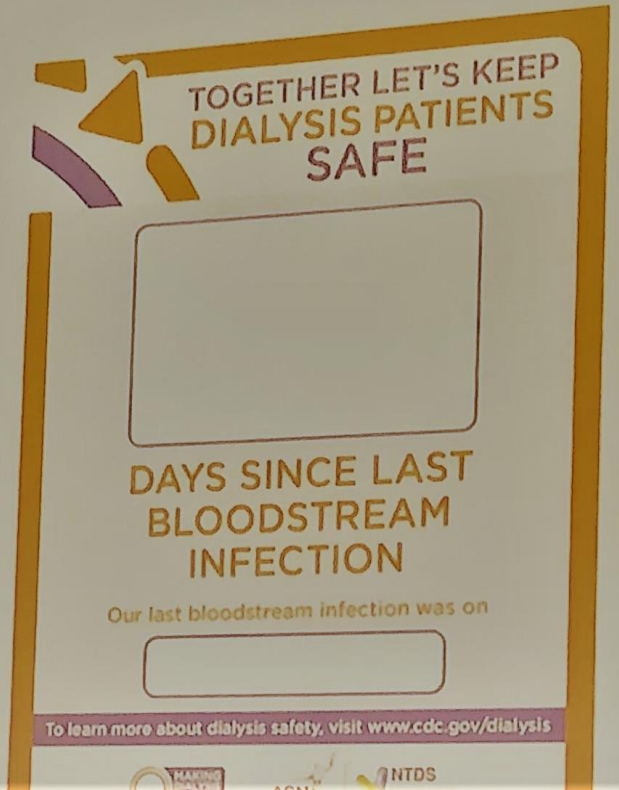
- Infections are the major cause of hospitalizations and death
- Rates of hospitalization due to infection are increasing
  - 43% higher in 2009 than in 1993
- Mortality rates due to infections caused by antimicrobial-resistant bacteria are 2-5 fold higher then infections caused by susceptible bacteria
- Antimicrobial resistance rates are among the highest in patients requiring maintenance hemodialysis

Time line of antimicrobial development



Clatworthy *et al.* Nature Chemical Biology:2007;3:541-8

CDC "Days Since Last Bloodstream Infection" Poster



Standard Precautions for all Healthcare Workers

- Perform hand hygiene
- Use personal protective equipment (PPE)
- Follow safe injection practices

Instructions for use

EDIT IN GOOGLE SLIDES

Click on the button under the presentation preview that says **"Use as Google Slides Theme"**.

You will get a copy of this document on your Google Drive and will be able to edit, add or delete slides.

You have to be signed in to your Google account.

EDIT IN POWERPOINT®

Click on the button under the presentation preview that says **"Download as PowerPoint template"**. You will get a .pptx file that you can edit in PowerPoint.

Remember to download and install the fonts used in this presentation (you'll find the links to the font files needed in the Presentation design slide)

More info on how to use this template at www.slidescarnival.com/help-use-presentation-template

I am Jayden Smith

I am here because I love to give presentations.

You can find me at @username

This is a slide title

- Here you have a list of items
- And some text
- But remember not to overload your slides with content

Your audience will listen to you or read the content, but won’t do both.

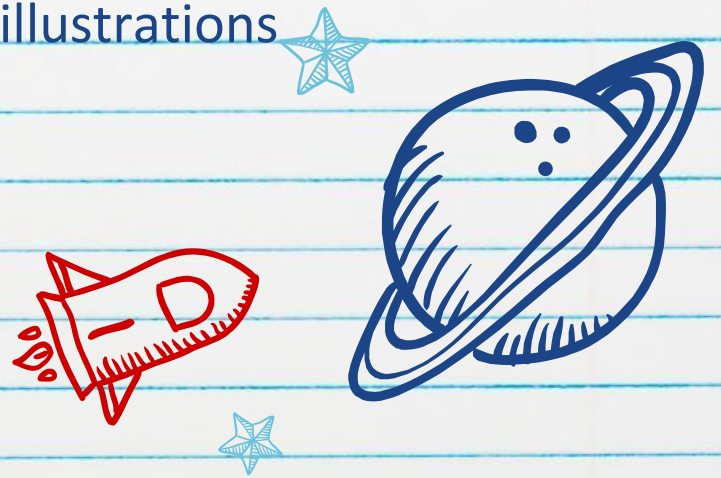
1.Transition headline

Let’s start with the first set of slides

“Quotations are commonly printed as a means of inspiration and to invoke philosophical thoughts from the reader”

Big concept

Bring the attention of your audience over a key concept using icons or illustrations



You can also split your content

White

Is the color of milk and fresh snow, the color produced by the combination of all the colors of the visible spectrum.

Black

Is the color of coal, ebony, and of outer space. It is the darkest color, the result of the absence of or complete absorption of light.

In two or three columns

Yellow
Is the color of gold, butter and ripe lemons. In the spectrum of visible light, yellow is found between green and orange.

Blue
Is the colour of the clear sky and the deep sea. It is located between violet and green on the optical spectrum.

Red
Is the color of blood, and because of this it has historically been associated with sacrifice, danger and courage.

worth a thousand words

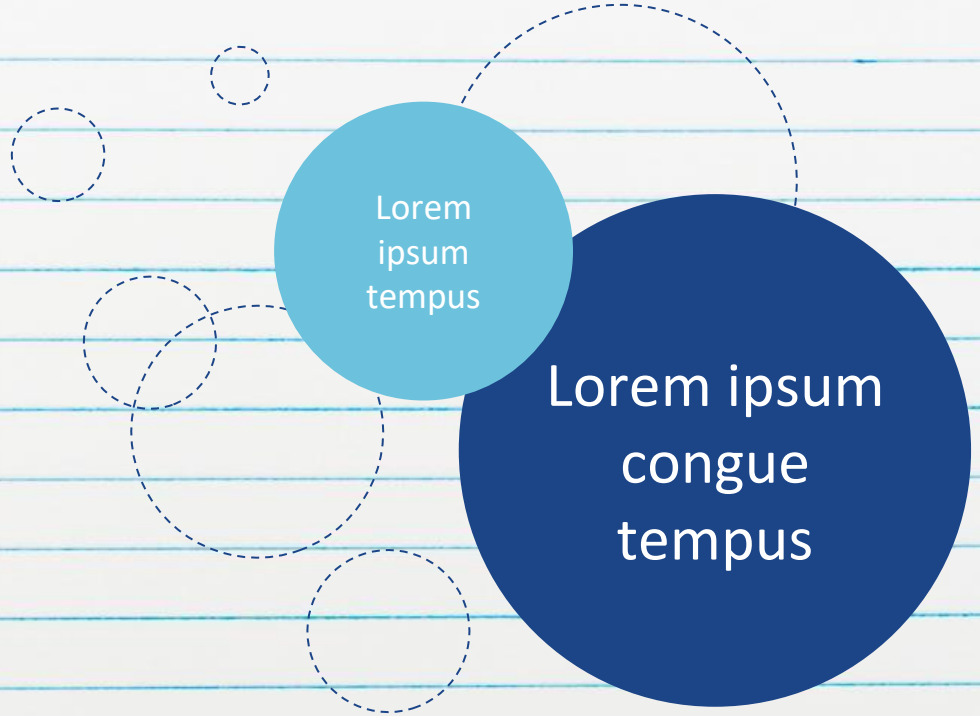
A complex idea can be conveyed with just a single still image, namely making it possible to absorb large amounts of data quickly.


Want big impact?
Use big image.


Want big impact?
Use big image.


Want big impact?
Use big image.

Use diagrams to explain your ideas



And tables to compare data

	A	B	C
Yellow	10	20	7
Blue	30	15	10
Orange	5	24	16

Maps

89,526,124

Whoa! That’s a big number, aren’t you proud?

89,526,124$

That’s a lot of money

185,244 users

And a lot of users

100%

Total success!

Our process is easy

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis sit amet odio vel purus bibendum luctus.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis sit amet odio vel purus bibendum luctus.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Duis sit amet odio vel purus bibendum luctus.

Let’s review some concepts

Yellow
Is the color of the sun, gold, butter and ripe lemons.

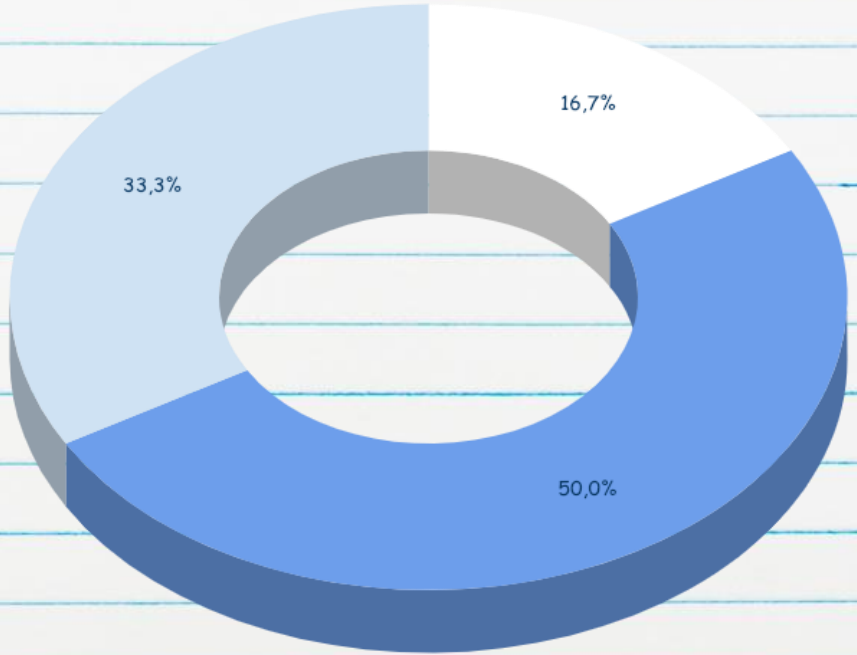
Blue
Is the colour of the clear sky and the deep sea.

Red
Is the color of blood, and associated with danger and courage.

Yellow
Is the color of the sun, gold, butter and ripe lemons.

Blue
Is the colour of the clear sky and the deep sea.

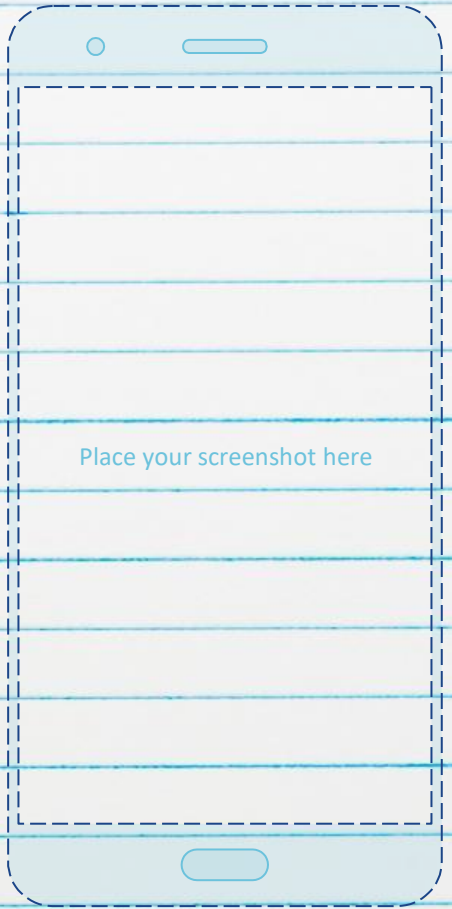
Red
Is the color of blood, and associated with danger and courage.



You can insert graphs from Google Sheets

Mobile project

Show and explain your web, app or software projects using these gadget templates.

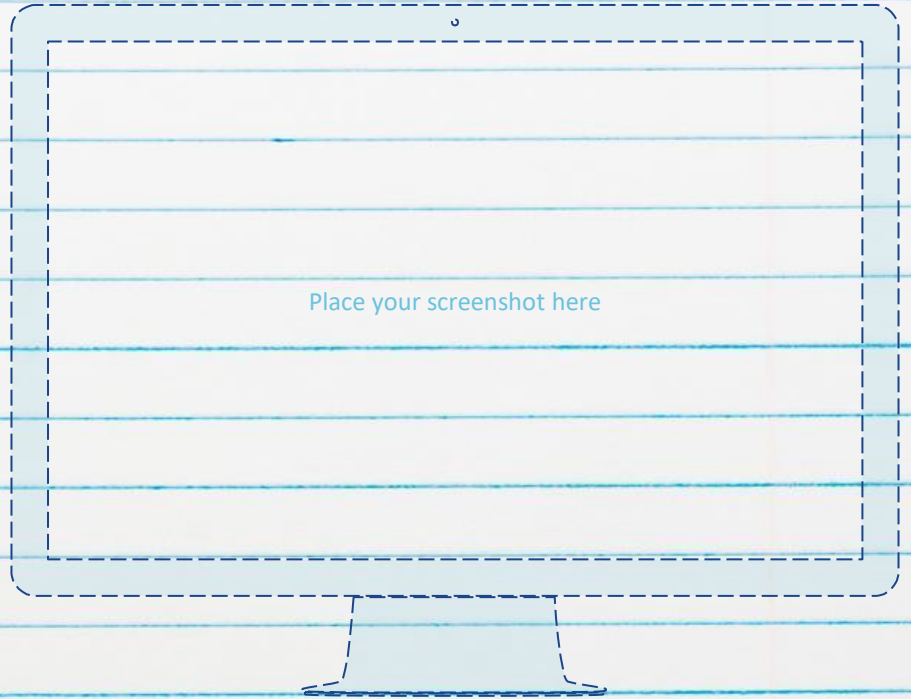


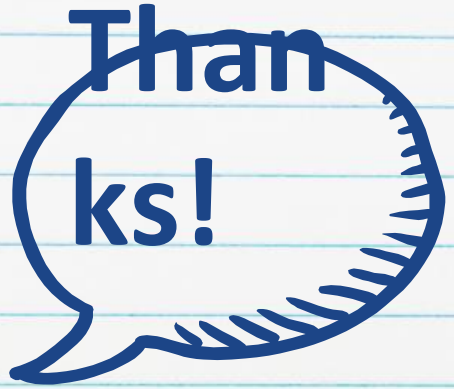
Tablet project

Show and explain your web, app or software projects using these gadget templates.

Desktop project

Show and explain your web, app or software projects using these gadget templates.





Any questions?

You can find me at @username &
user@mail.me

Credits

Special thanks to all the people who made and released these awesome resources for free:

- Presentation template by SlidesCarnival
- Photographs by Unsplash

Presentation design

This presentation uses the following typographies:

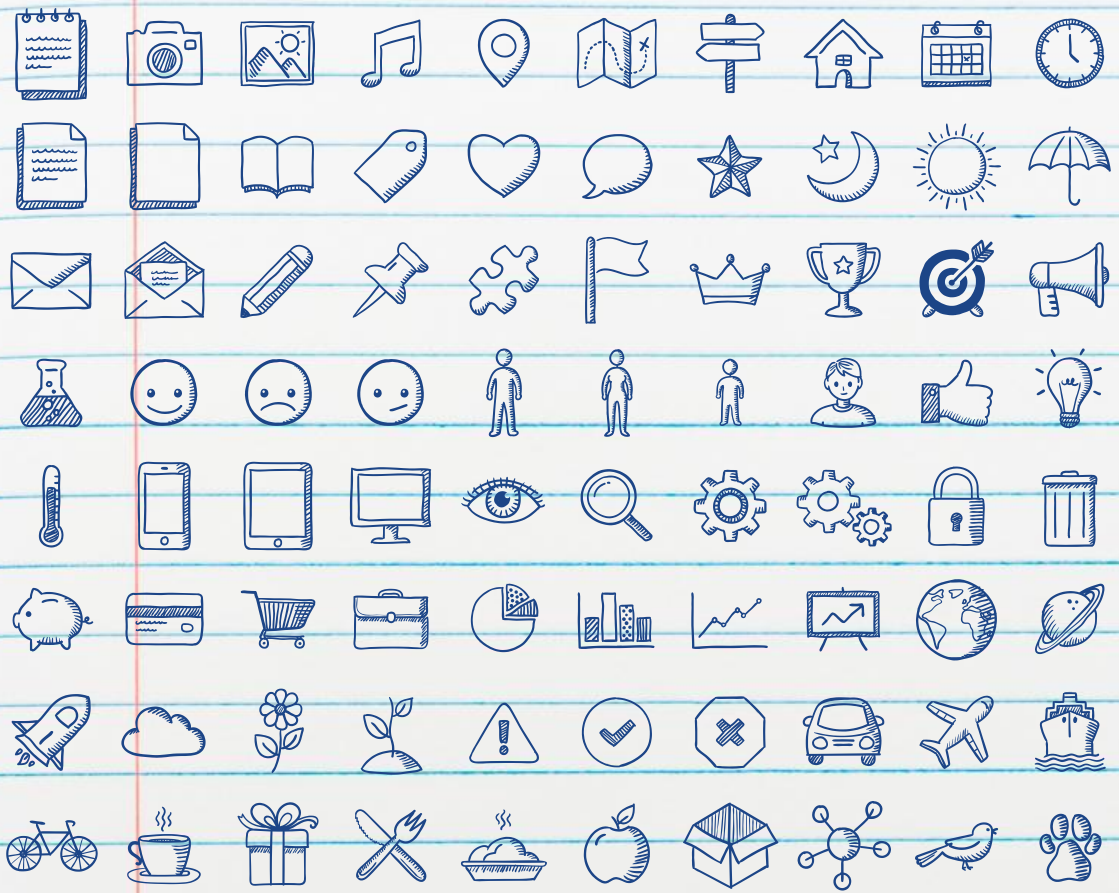
- Titles: Amatic SC
- Body copy: Caveat

You can download the fonts on these pages:

https://www.fontsquirrel.com/fonts/amatic

https://www.fontsquirrel.com/fonts/caveat

You don’t need to keep this slide in your presentation. It’s only here to serve you as a design guide if you need to create new slides or download the fonts to edit the presentation in PowerPoint®



SlidesCarnival icons are editable shapes.

This means that you can:

- Resize them without losing quality.
- Change fill color and opacity.
- Change line color, width and style.

Isn’t that nice? :)

Examples:

Now you can use any emoji as an icon!
And of course it resizes without losing quality and you can change the color.

How? Follow Google instructions
https://twitter.com/googledocs/status/730087240156643328

Slides Carnival

Free templates for all your presentation needs

For PowerPoint and Google Slides

100% free for personal or commercial use

Ready to use, professional and customizable

Blow your audience away with attractive visuals