Concensus Philly

Pr. Sébastien LUSTIG, Dr Cécile BATAILLER, Pr. Tristan FERRY

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Claude Bernard Lyon1 University, Lyon

Arthritis and Joint Replacement Department
Centre de Référence des IOA complexes de Lyon (CRIOAc Lyon)

ICM 2018
Mission

To bring together medical and scientific experts from around the world to define the state of the art in orthopaedic infections

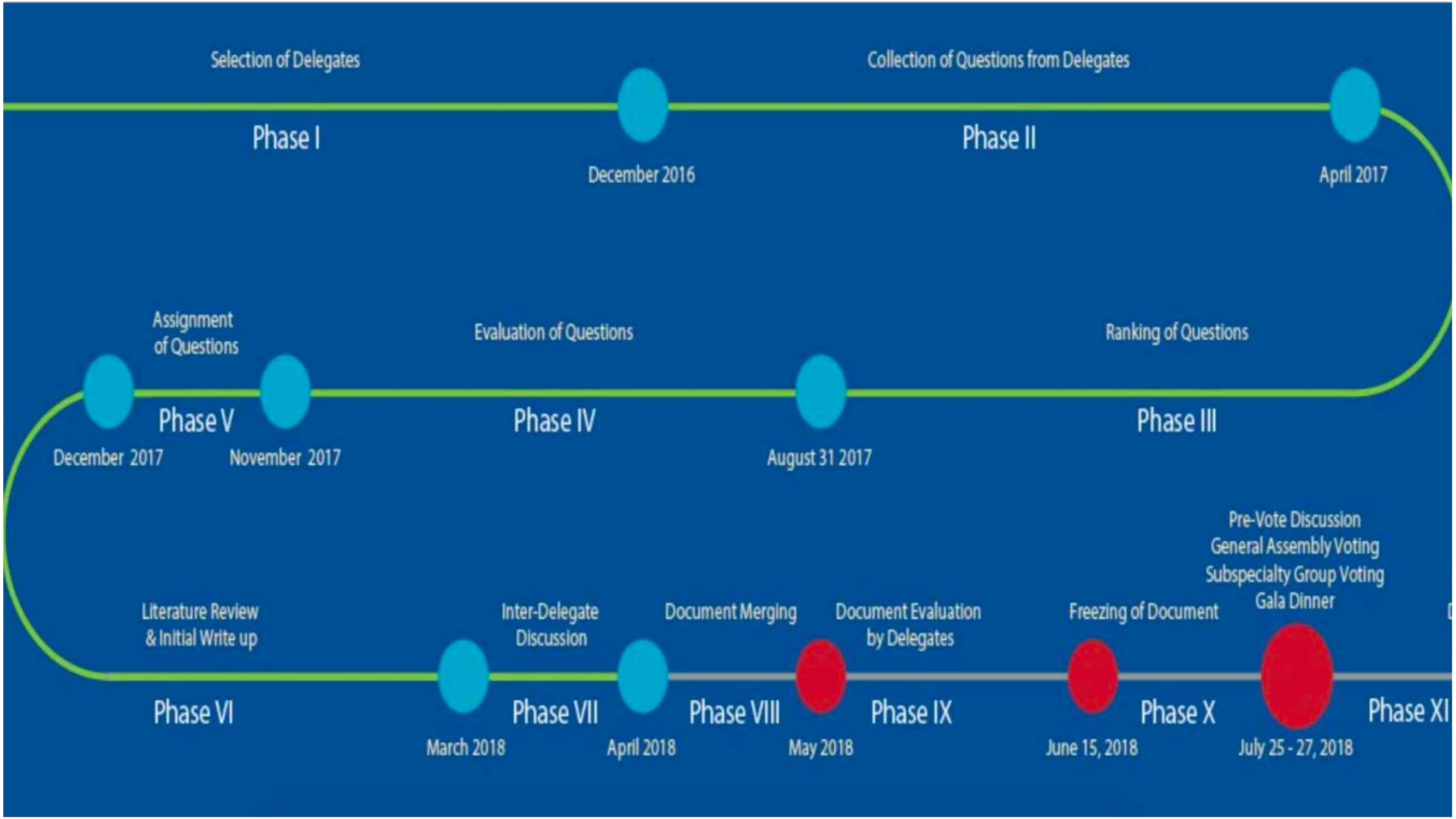
First International Consensus on Periprosthetic Joint Infection August 1-3, 2013

Javad Parvizi MD, FRCS

Thomas Jefferson University, Philadelphia

July 2018

The seminar was hosted by the Rothman Orthopaedic Institute and was attended by ***650 international experts*** selected to develop recommendations for the management of BJI using the **Delphi process.**


Selection of Delegates
Phase I
December 2016
Collection of Questions from Delegates
Phase II
April 2017
Assignment of Questions
Phase V
December 2017
November 2017
Evaluation of Questions
Phase IV
August 31 2017
Ranking of Questions
Phase III
Literature Review & Initial Write up
Phase VI
March 2018
Inter-Delegate Discussion
Phase VII
April 2018
Document Merging
Phase VIII
May 2018
Document Evaluation by Delegates
Phase IX
Freezing of Document
Phase X
June 15, 2018
Pre-Vote Discussion
General Assembly Voting
Subspecialty Group Voting
Gala Dinner
July 25 - 27, 2018
Phase XI

Step VI: Systematic Review

- Over 200,000 publications reviewed

Delegates

- 890 Delegates
- 98 Countries
- Over 200 societies
- 98 Presidents

Chile
Diaz, Claudio
Mella, Claudio
Parra Aguilera, Samuel
Schweitzer, Daniel

China
Cao, Li
Chen, Jiying
Dang, Xiaoqian
Guo, Shengjie
Hu, Ruyin
Huang, Wei
Lin, Jianhao
Shao, Hongyi
Shen, Bin
Shen, Hao
Tang, Wai Man
Tian, Shaoqi
Wang, Qiaojie
Weng, Xisheng
Wu, Lidong
Xu, Chi
Yan, Chun Hoi
Zeng, YiRong
Zhang, Wenming
Zhang, Xianlong
Zhou, Yixin
Zhou, Yong Gang

Colombia
Bautista, Maria Piedad
Bonilla León, Guillermo A.
Calixto, Luis F.
Cortes Jiménez, Luis E.
García Ricaurte, Julio César
García, Maria Fernanda
Lara Cotacio, Gilberto
Leal, Jaime A.
Llinás Volpe, Adolfo
Lopez, Juan Carlos
Manrique, Jorge
Martínez, Saùl
Monsalvo, Daniel
Palacio Villegas, Julio César
Pesantez, Rodrigo
Pinzon, Andres
Ramirez, Isabel
Restrepo, Camilo
Reyes, Francisco
Rocha, Cesar H.
Sánchez Correa, Carlos A.
Stangl, Paul
Suarez, Cristina

Costa Rica
Villafuerte, Jorge

Croatia
Bićanić, Goran
Bohaček, Ivan
Ivković, Alan

Czech Republic
Gallo, Jiří
Jahoda, David

Denmark
Gromov, Kirill
Gundtoft, Per
Kjaersgaard-Andersen, Per
Lange, Jeppe
Moser, Claus
Overgaard, Soeren

Dominica
Leibnitz, Martinez

Ecuador
Alemán, Washington
Barredo, Ramón
Bracho, Carlos
Gomez, José
Naula, Victor

Egypt
Abdel Karim, Mahmoud
Ebied, Ayman
ElGanzoury, Ibrahim
Emara, Khaled J.
Osman, Wael Samir
Saleh, Usama H.

El Salvador
Orlando Villanueva, Andres

Estonia
Mätson, Aare
Mitt, Piret

Finland
Puhto, Ari-Pekka
Puhto, Teija
Virolainen, Petri

Former Yugoslav Republic of Macedonia
Cirivri, Jasmin
Talevski, Darko
Bozinovski, Zoran

France
Argenson, Jean Noël
Bauer, Thomas
Ferry, Tristan
Jacquot, Adrien
Jenny, Jean-Yves
Lustig, Sébastien
Mansat, Pierre
Senneville, Eric

France

Argenson, Jean Noël
Bauer, Thomas
Ferry, Tristan
Jacquot, Adrien
Jenny, Jean-Yves
Lustig, Sébastien
Mansat, Pierre
Senneville, Eric

Prevention / Treatment

Question: Does the type of venous thromboembolic (VTE) prophylaxis influence the risk of SSI/PJI in patients undergoing orthopedic procedures?

RESEARCHED BY:

Ronald Huang

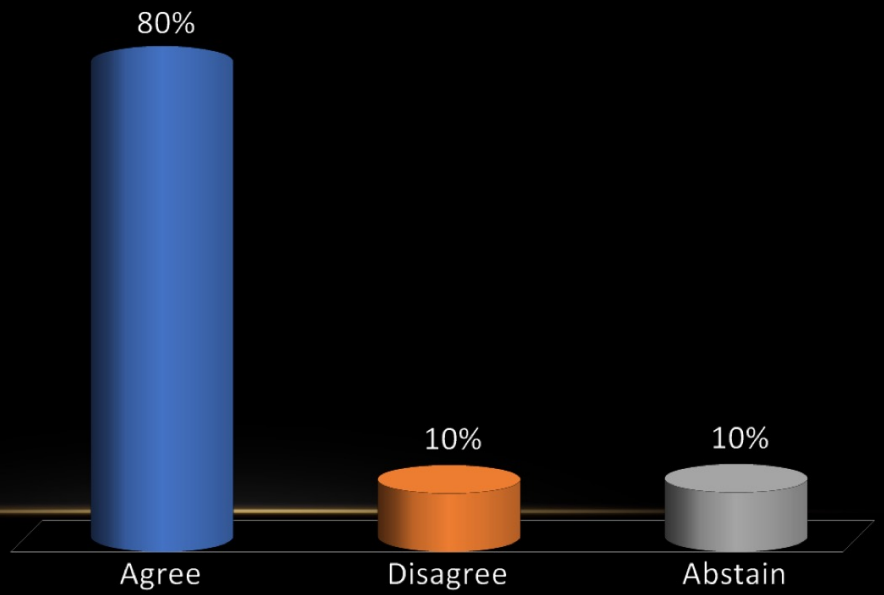
James J Purtill

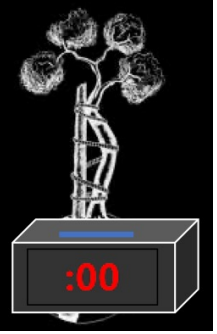
I. Remzi Tozun

Recommendation: Yes. In a majority of studies evaluating venous thromboembolic (VTE) prophylaxis in patients undergoing total joint arthroplasty (TJA), aspirin appears to result in a lower risk of SSI/PJI than anticoagulants (vitamin K antagonists, heparin-based products, factor Xa inhibitors, and direct thrombin inhibitors).

Level of Evidence: Moderate

A. Agree
B. Disagree
C. Abstain





Authors: Arash Aalirezaie, Nirav K. Patel, Zoran Bozinovski, Hamed Vahedi, Perica Lazarovski

QUESTION 5: Does a prior arthroscopy of the knee increase the risk of subsequent surgical site infections/periprosthetic joing infections (SSIs/PJIs) in patients undergoing elective arthroplasty?

RECOMMENDATION: There is no evidence to suggest that a prior arthroscopy of the knee increases the risk of subsequent SSIs/PJIs in patients undergoing total knee arthroplasty (TKA).

LEVEL OF EVIDENCE: Moderate

DELEGATE VOTE: Agree: 81%, Disagree: 12%, Abstain: 7% (Super Majority, Strong Consensus)

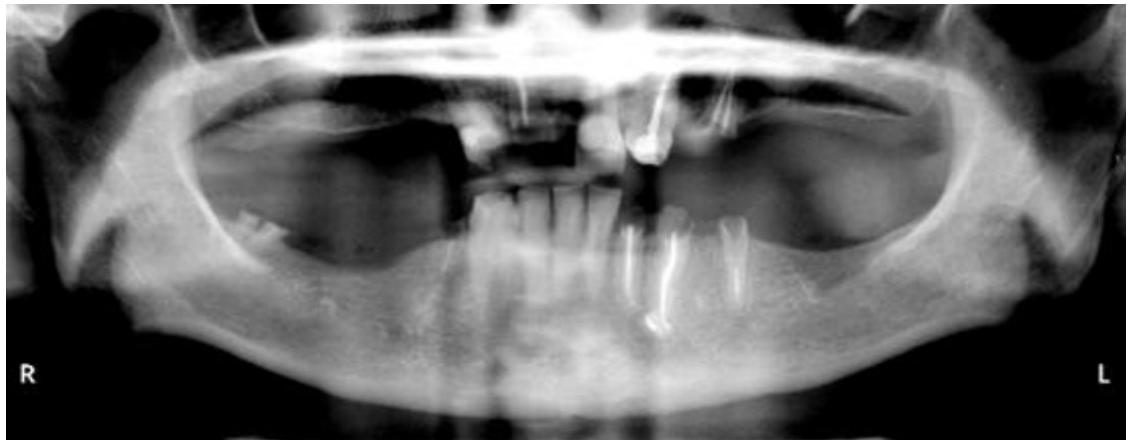
No 👎

Preoperative urine analysis

- Not necessary if no symptoms,
- No indication to treat asymptomatic bacteriuria,
- Urine analysis in case of symptoms as treatment of a clinically evident symptomatic urinary tract infection is essential.

Dental Hygiene

Patients with ***poor dental hygiene should be identified and managed,*** as they are at greater risk of prosthetic injection, even if hematogenous inoculation from a dental focus is low.



Biotherapies et immunosuppressive drugs

- ***Biotherapies*** *for patients with rheumatoid arthritis or other inflammatory rheumatism must be suspended, with a time delay between the last injection and TKA that is specific to each molecule,*

- ***Immunosuppressive drugs*** *are generally continued.*

DMARDs: CONTINUE these medications through surgery.	Dosing Interval	Continue/Withhold
Methotrexate	Weekly	Continue
Sulfasalazine	Once or twice daily	Continue
Hydroxychloroquine	Once or twice daily	Continue
Leflunomide (Arava)	Daily	Continue
Doxycycline	Daily	Continue
BIOLOGICS: STOP these medications prior to surgery and schedule surgery at the end of the dosing cycle. RESUME medications at minimum 14 days after surgery in the absence wound healing problems, surgical site infection or systemic infection.	**Dosing Interval**	**Schedule Surgery (relative to last biologic dose administered)**
Adalimumab (Humira) 40 mg	Every 2 weeks	Week 3
Etanercept (Enbrel) 50 mg or 25 mg	Weekly or twice weekly	Week 2
Golimumab (Simponi) 50 mg	Every 4 weeks (SQ) or Every 8 weeks (IV)	Week 5 Week 9
Infliximab (Remicade) 3 mg/kg	Every 4, 6 or 8 weeks	Week 5, 7 or 9
Abatacept (Orencia) weight-based 500 mg; IV 1000 mg; SQ 125 mg	Monthly (IV) or weekly (SQ)	Week 5 Week 2
Rituximab (Rituxan) 1000 mg	2 doses 2 weeks apart every 4-6 months	Month 7
Tocilizumab (Actemra) IV 4 mg/kg; SQ 162 mg	Every week (SQ) or Every 4 weeks (IV)	Week 3 Week 5
Anakinra (Kineret) SQ 100 mg	Daily	Day 2
Secukinumab (Cosentyx) 150 mg	Every 4 weeks	Week 5

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American College of Rheumatology/American Association of Hip and Knee Surgeons guideline for the perioperative management of antirheumatic medication in patients with rheumatic diseases undergoing elective total hip or total knee arthroplasty. J Arthroplasty. 2017;32:2628–2638.

Smoking

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Smoking represents an independent, modifiable risk factor that significantly compounds the risks of SSIs/PJIs when present alongside other comorbidities.

Therefore, active smoking, especially heavy tobacco use, represents a relative contraindication *to total joint arthroplasty until enrolled in a smoking cessation program for at least four weeks.*

Search for S. aureus nasal carriage

- No routine nasal swab
- Search strategy to eradicate possible in the following situations:
    - Revision surgery
    - Smoking patient

2018

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Authors: Yale Fillingham, Ali Parsa, Sergei Oshkukov, A. Seth Greenwald

QUESTION 1: Is there sufficient evidence to support the use of antibiotic-loaded cement in primary total knee arthroplasty (TKA) or total hip arthroplasty (THA) to reduce the risk of surgical site infections/periprosthetic joint infections (SSIs/PJIs)?

RECOMMENDATION: There is no conclusive evidence to demonstrate that routine use of antibiotic-loaded cement in primary TKA or THA reduces the risk of subsequent SSIs/PJIs. Recent high level evidence and registry data has not demonstrated a reduction in SSI/PJIs. Furthermore, the added cost, the potential for the emergence of resistant organisms and the potential adverse effect of antibiotics on the host provide adequate reasons to refrain from routine use of antibiotic loaded cement during primary total joint arthroplasty.

LEVEL OF EVIDENCE: Moderate

DELEGATE VOTE: Agree: 38%, Disagree: 58%, Abstain: 4% (NO Consensus)

Authors: Yale Fillingham, Ali Parsa, Sergei Oshkukov, A. Seth Greenwald

TABLE 1. Summary of literature pertaining to antibiotic-loaded cement

PubMed ID	One-stage vs. Two-stage	# Investigated Prostheses	Follow-up Interval (months)	ALBC Details	% Failure
24923669 [18]	One	28	78	1 gm Gent, 1 gm Vanc per pack	0
7497685 [19]	Two	26	31	1.2 gm Tobra per pack PMMA	0
10535593 [20]	Two	40	40	1.2 gm Tobra per pack	25
10990301 [21]	Two	45	48	1.2 gm Tobra per pack	9
11097443 [22]	Two	69	63	1 gm Tobra per pack	9
11216723 [23]	Two	53	56	1.2 gm Tobra per pack	17
12051001 [24]	Two	10	18	0.5 gm Gent per pack	0
15343539 [25]	Two	24	33	2.4 gm Tobra, 1 gm Vanc per pack	8
15991126 [26]	Two	44	65	1.2 gm Tobra per pack	3
15662313 [27]	Two	50	73	1.2 gm Tobra per pack	4
17162176 [28]	Two	21	52	1 gm Tobra per pack	5
17966006 [29]	Two	24	48	1 gm Gent, 1 gm Clinda per pack	4
19553076 [30]	Two	53	49	750mg cefuroxime	17
19299221 [31]	Two	13	48	2 gm Vanc per pack	0
20087702 [32]	Two	27	58	1 gm Gent, 1 gm Clinda per pack	4
20202852 [33]	Two	10	31	0.5 gm Gent, 1 gm Vanc per pack	0
22863338 [34]	Two	21	32	0.5 gm Gent, 1 gm Vanc per pack	4
26272061 [35]	Two	82	36	0.5 gm Gent per pack	15
21866421 [36]	Two	117	46	1.2 gm tobra, 1 gm Vanc per pack	28
14563794 [37]	Two	58	41	0.6 gm Tobra per pack	4
15190550 [38]	One	22	120	1.2 gm Tobra per pack	9
10611868 [39]	One	24	108	2 gm 1st Generation Cephalosporin per pack	8.3
721853 [40]	One & Two	67	24	0.5 gm Gent per pack	12
3769248 [41]	One	100	38	0.5 gm Gent per pack	9

TABLE 2. Summary of pooled data pertaining to antibiotic-loaded cement at reimplantation

Variable	Tobra (T)	Gent (G)	Vanco (V)	Cefuroxime	1st Gen cephalosporin	V+T	V+G	G+Clinda (C)
Number of studies	10	4	1	1	1	2	3	2
Two-stage	9	3*	1	1	-	2	2	2
One-stage	1	2*	-	-	1	-	1	-
Dose per 40 gm PMMA pack	0.6-1.2 gm	0.5 gm	2.0 gm	750mg	2.0 gm	1.0 gm V 1.2-2.4 gm T	1.0 gm V 0.5-1.0 gm G	1.0 gm G 1.0 gm C
Number of prostheses	428	259	13	53	24	141	59	51
Average follow-up (mo)	59	29	48	49	108	40	47	53
PJI recurrence incidence (%): range and average	0-25 8.5	0-15 9	0 0	17 17	8 8	8-28 18**	0-4 1.3	4 4

* Numbers do not add up due to one study containing both one-stage and two-stage procedures
** Average significantly skewed to lower value as one study with 28% PJI recurrence incidence included 117 of the total 141 patients

Authors: Mark Spangehl, Xianlong Zhang, Simon W. Young

QUESTION 3: Does the use of personal protection suits (space suits) influence the rate of surgical site infections/periprosthetic joint infections (SSIs/PJIs) in patients undergoing joint arthroplasty?

RECOMMENDATION: In the absence of strong evidence, we believe the use of personal protection suits does not reduce the rate of subsequent SSIs/PJIs in patients undergoing joint arthroplasty.

LEVEL OF EVIDENCE: Moderate

DELEGATE VOTE: Agree: 87%, Disagree: 11%, Abstain: 2% (Super Majority, Strong Consensus)

Authors: Carles Amat Mateu, Jiying Chen, Samih Tarabichi

QUESTION 5: Does simultaneous bilateral hip or knee arthroplasty (SBTHA or SBTKA) increase the risk of subsequent surgical site infections/periprosthetic joint infections (SSIs/PJIs) compared to unilateral or staged bilateral arthroplasty?

RECOMMENDATION: SBTHA or SBTKA does not increase the risks of SSIs/PJIs compared to unilateral or staged bilateral arthroplasty.

LEVEL OF EVIDENCE: Moderate

DELEGATE VOTE: Agree: 79%, Disagree: 15%, Abstain: 6% (Super Majority, Strong Consensus)

Authors: Jeffrey Granger, Gustavo A. Garcia, Michel Malo, Moneer M. Abouljoud

QUESTION 5: Does the use of separate instruments for each side reduce the rate of subsequent surgical site infections/periprosthetic joint infections (SSIs/PJIs) in patients undergoing simultaneous bilateral total hip or knee arthroplasties (BTHA or BTKA)?

RECOMMENDATION: No. The use of separate instruments for each side does not appear to reduce the rate of subsequent SSIs/PJIs in patients undergoing simultaneous BTHA or BTKA.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 72%, Disagree: 19%, Abstain: 9% (Super Majority, Strong Consensus)

HK-39: What is the definition of PJI of the knee and the hip? Can the same criteria be used for both joints?

RESEARCHED BY:

Noam Shohat MD
Thomas Bauer MD
Martin Bhuttaro MD
Nicolaas Budhiparma MD
Craig Della Valle MD
Thorsten Gehrke MD
Luiz S Marcelino Gomes MD
Seung Beom Han MD
Yutaka Inaba MD
Jean-Yves Jenny MD
Per Kjaersgaard-Andersen,MD
Mel Lee MD
Adolfo Lina MD
Konstantinos Malizos MD
Rhidian Morgan Jones MD
Javad Parvizi MD
Patricia Peel MD
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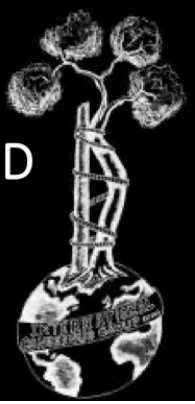
John Segreti MD
Ricardo Sousa MD
Mark Spanghel MD
Rashid Tikilov MD
Ibrahim Tuncay MD
Eivind Witso MD
Marjan Wouthuyzen-Bakker MD
Simon Young MD
Xianlong Zhang MD
Yixin Zhou MD
Werner Zimmerli MD



Parvizi J, Tan TL, Goswami K, Higuera C, Della Valle C, Chen AF, et al.

The 2018 Definition of Periprosthetic Hip and Knee Infection: An Evidence-Based and Validated.

J Arthroplasty 2018;33(5):1309-1314.e2.

Major criteria (at least one of the following)	Decision
Two positive cultures of the same organism	Infected
Sinus tract with evidence of communication to the joint or visualization of the prosthesis	

Major criteria (at least one of the following)	Decision
Two positive cultures of the same organism	Infected
Sinus tract with evidence of communication to the joint or visualization of the prosthesis	

Preoperative Diagnosis		Minor Criteria	Score	Decision
	Serum	Elevated CRP *or* D-Dimer	2	≥6 Infected
		Elevated ESR	1	
	Synovial	Elevated synovial *WBC count or LE*	3	2-5 Possibly Infected [a]
		Positive alpha-defensin	3	
		Elevated synovial PMN (%)	2	0-1 Not Infected
		Elevated synovial CRP	1	

	Acute PJI< 90 days	Chronic PJI >90 days
Erythrocyte Sedimentation Rate (mm/hr)	Not helpful. No threshold was determined	30
C-Reactive Protein (mg/L)	100	10
Synovial White Blood Cell Count (cells/µl)	10,000	3,000
Synovial Polymorphonuclear (%)	90	80
Leukocyte Esterase	+ Or ++	+ Or ++

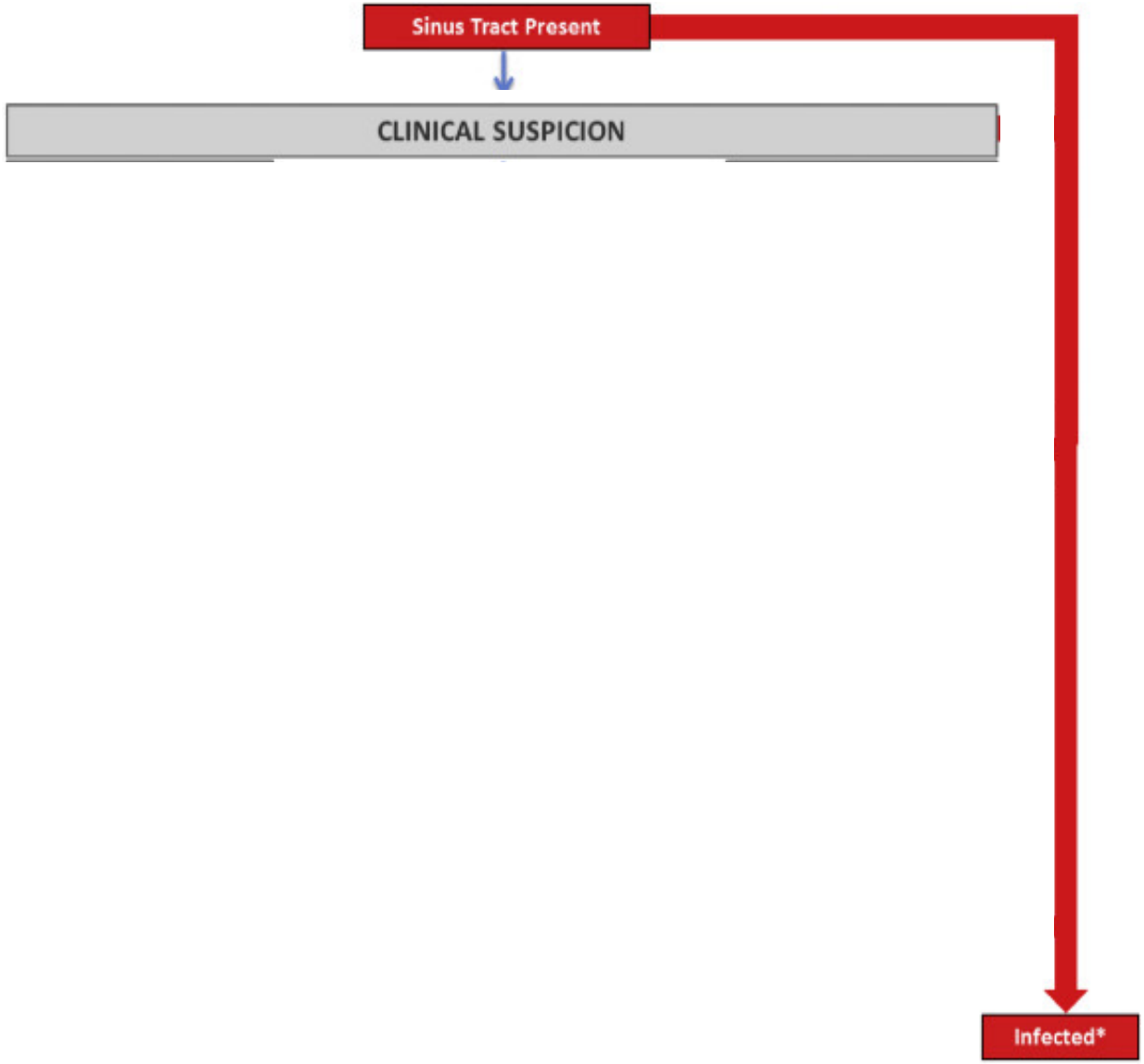
Major criteria (at least one of the following)	Decision
Two positive cultures of the same organism	Infected
Sinus tract with evidence of communication to the joint or visualization of the prosthesis	

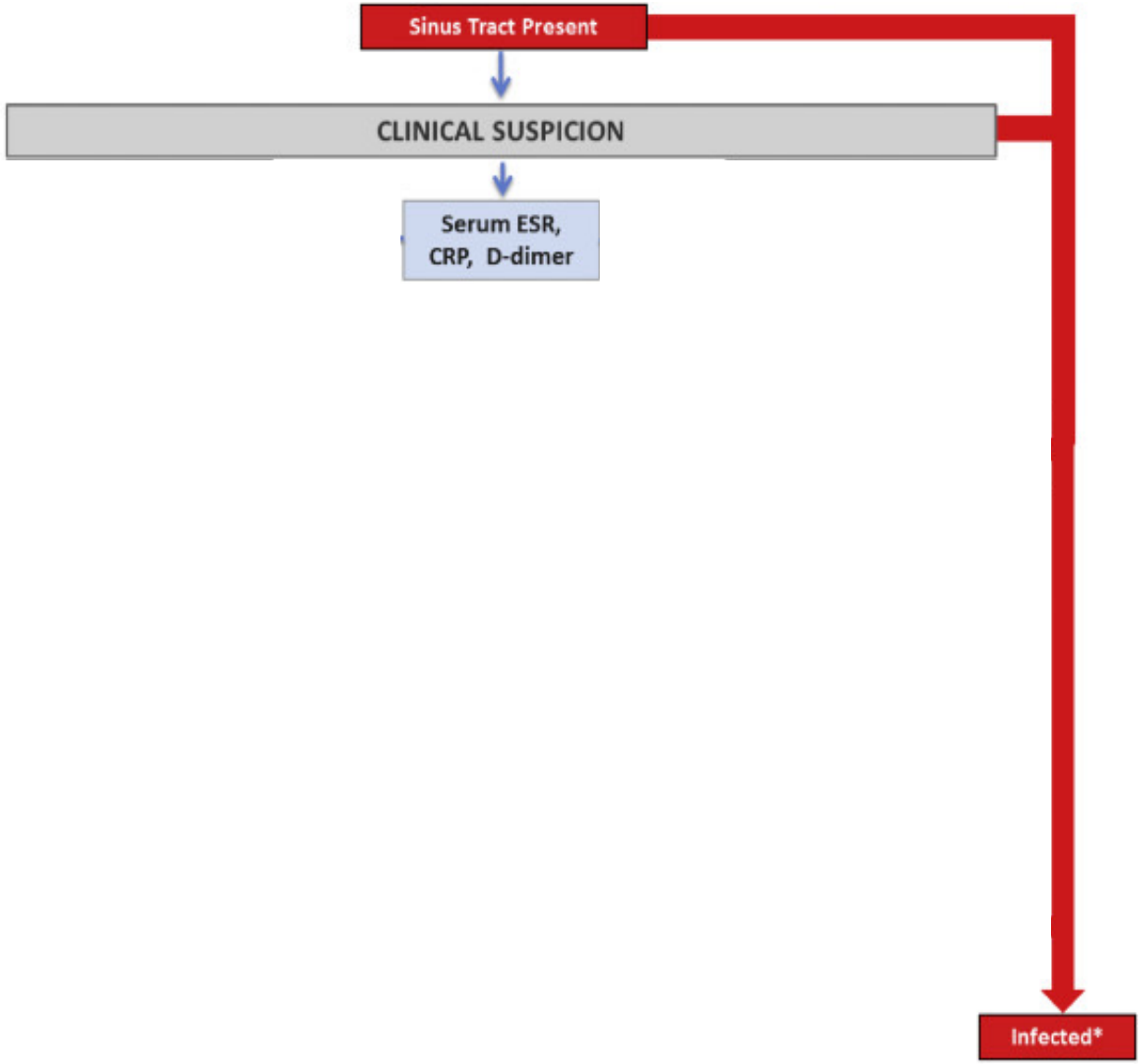
		Minor Criteria	Score	Decision
Preoperative Diagnosis	Serum	Elevated CRP *or* D-Dimer	2	≥6 Infected
		Elevated ESR	1	
	Synovial	Elevated synovial *WBC count or LE*	3	**2-5 Possibly Infected** [a]
		Positive alpha-defensin	3	
		Elevated synovial PMN (%)	2	0-1 Not Infected
		Elevated synovial CRP	1	

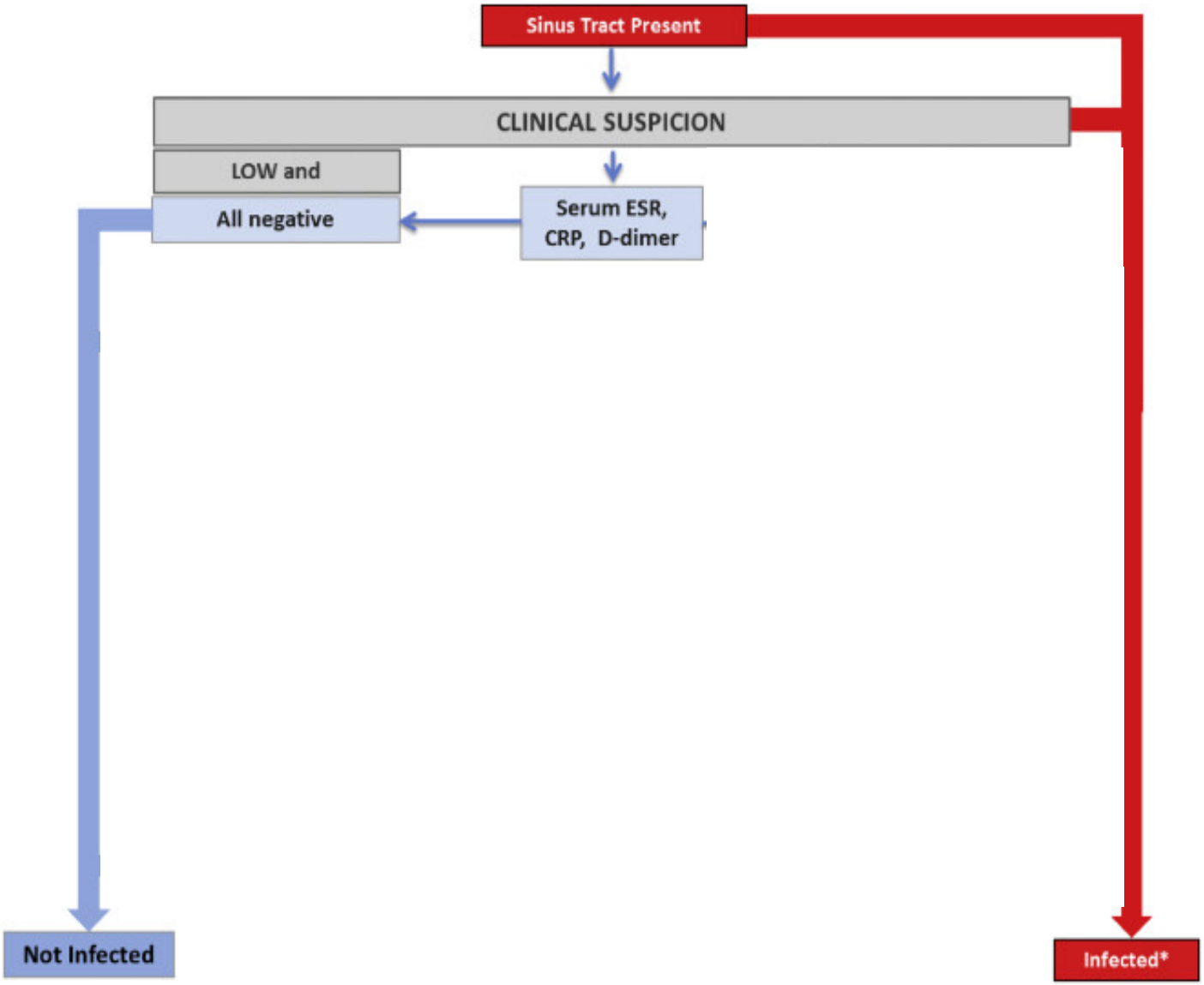
	Inconclusive pre-op score *or* dry tap [a]	Score	Decision
Intraoperative Diagnosis	Preoperative score	-	≥6 Infected
	Positive histology	3	**4-5 Inconclusive** [b]
	Positive purulence	3	
	Single positive culture	2	≤3 Not Infected

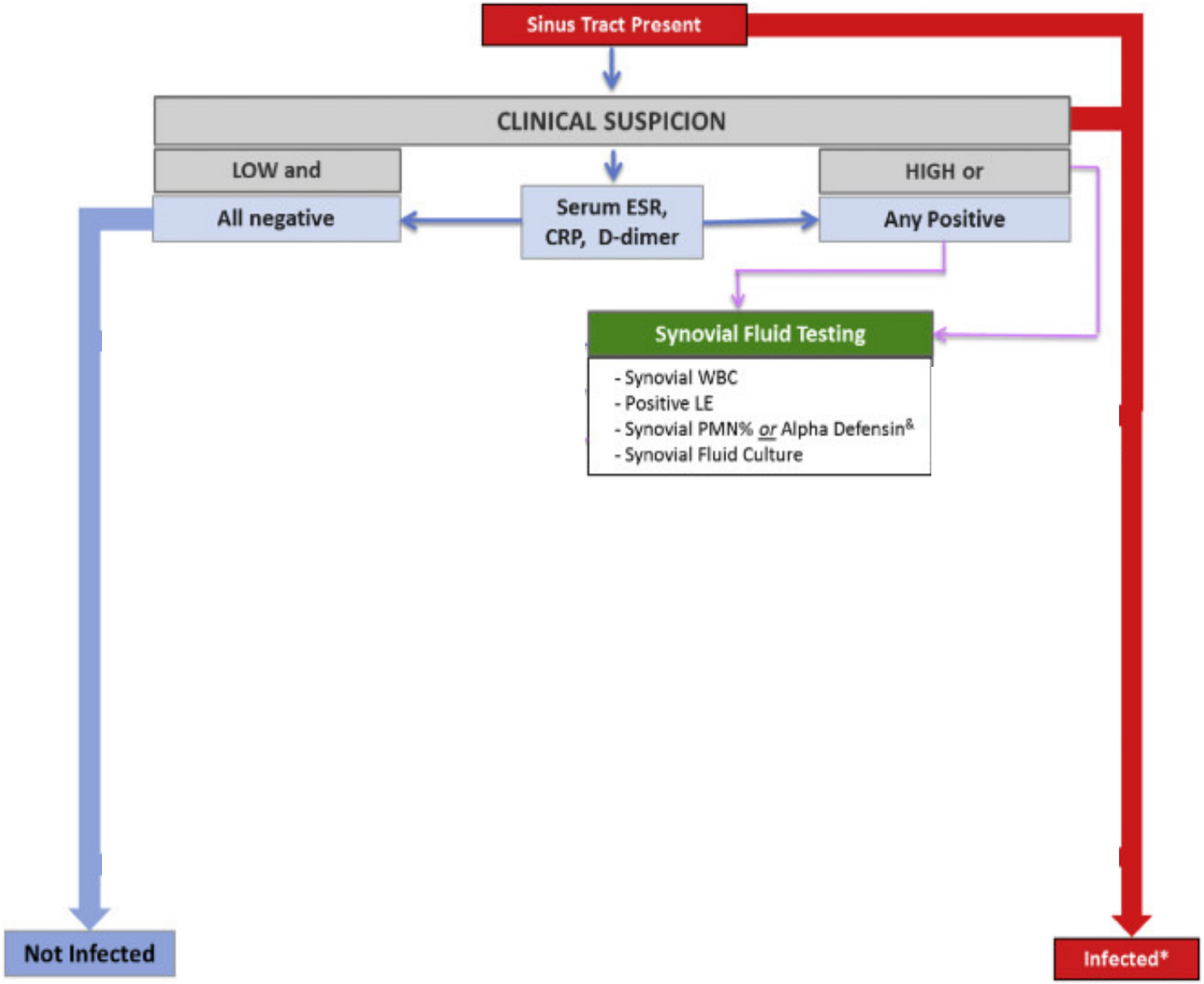
Shohat N, Tan TL, Della Valle CJ, Calkins TE, George J, Higuera C, et al.
Development and Validation of an Evidence-Based Algorithm for Diagnosing Periprosthetic Joint Infection.
J Arthroplasty 2019 Nov;34(11):2730-2736.e1.

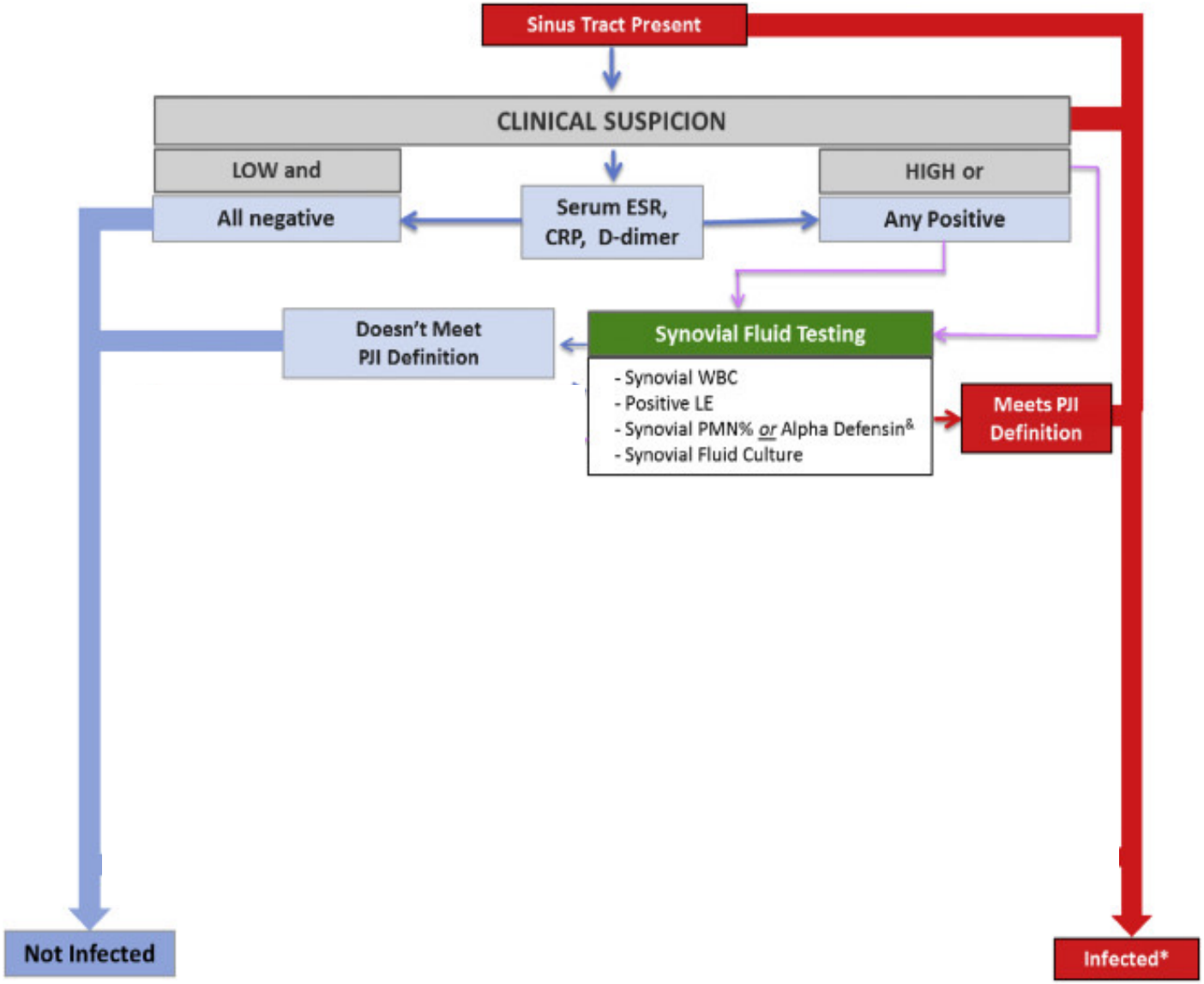
CLINICAL SUSPICION

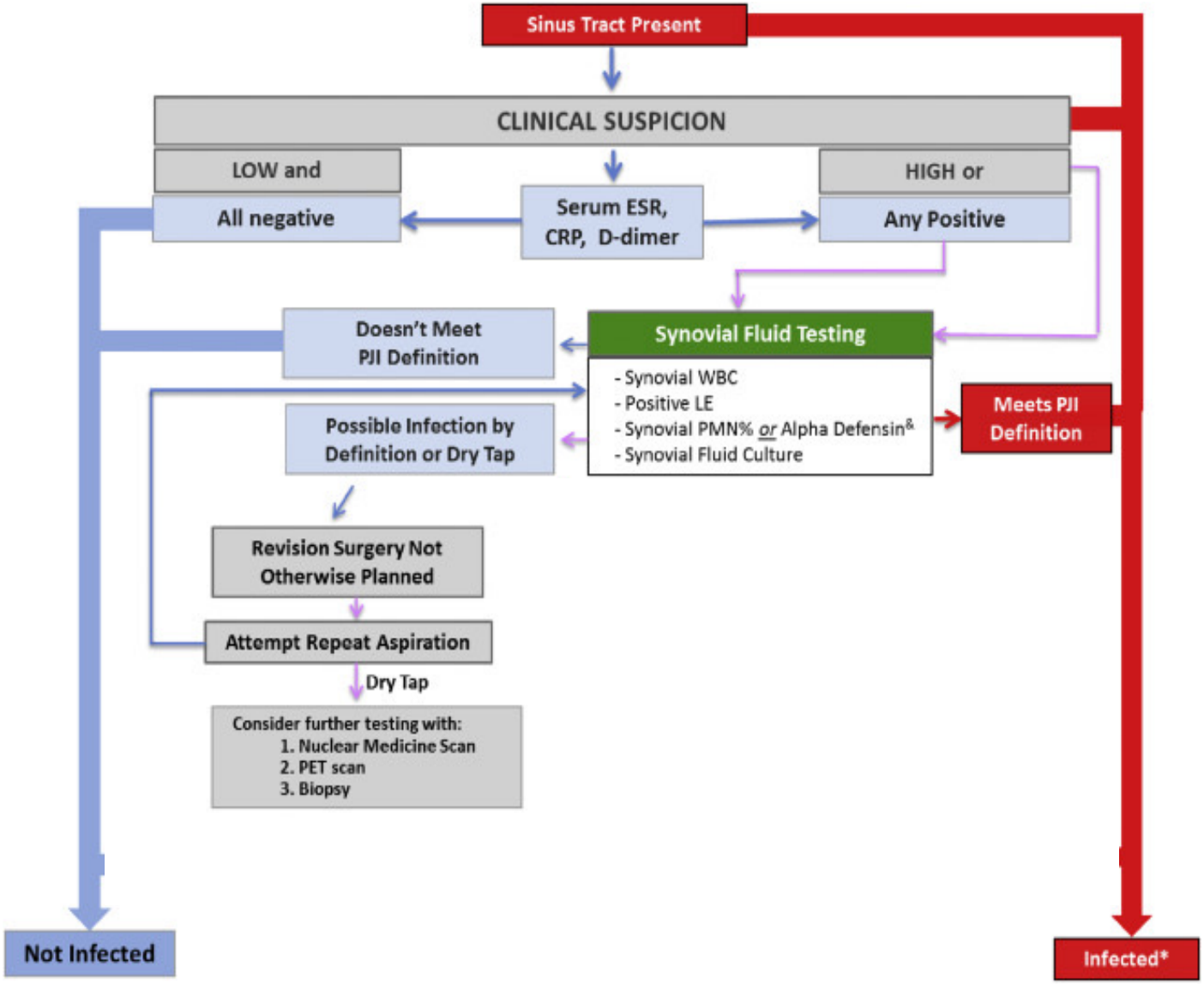

Sinus Tract Present
CLINICAL SUSPICION
Infected*

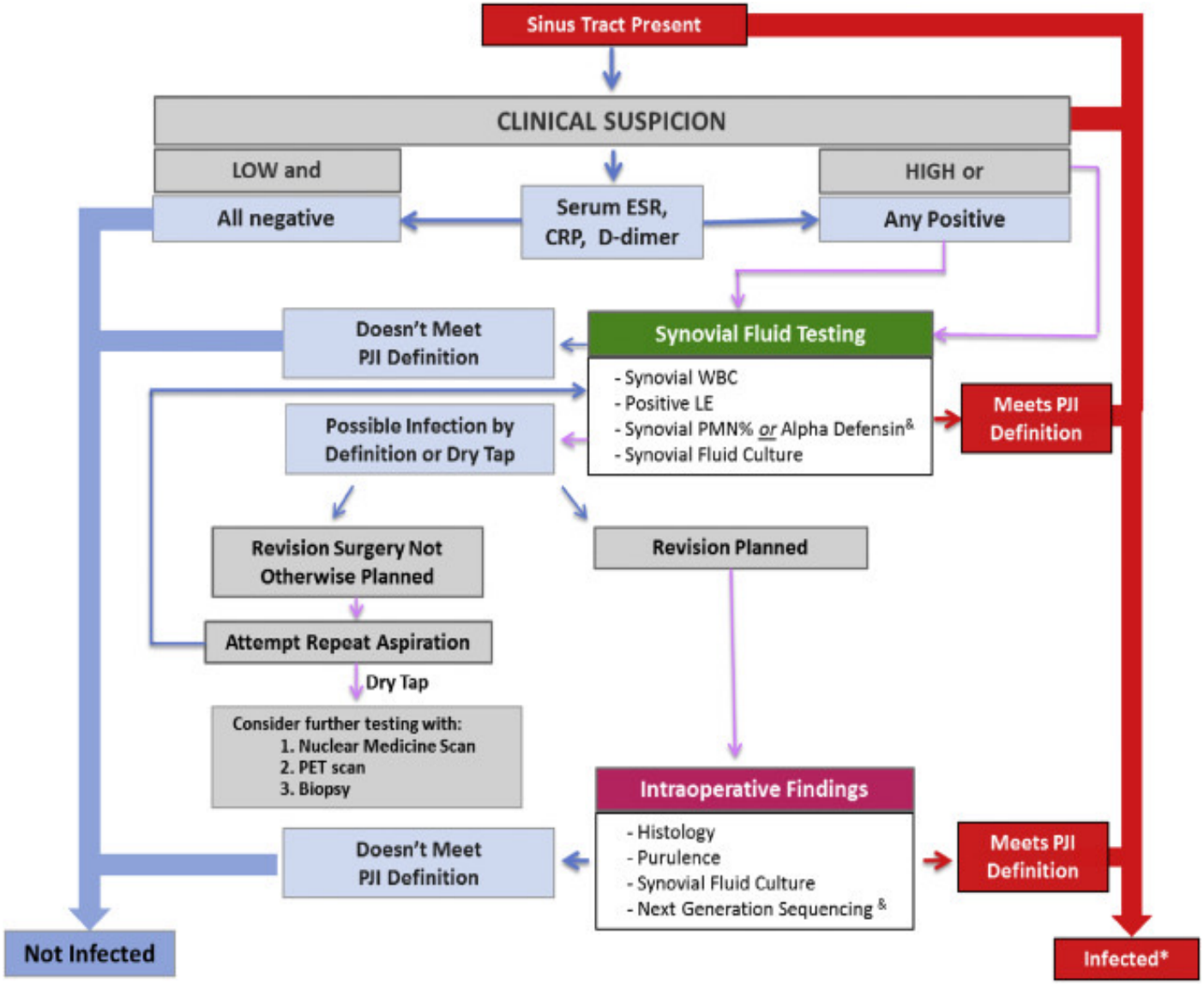

Sinus Tract Present
CLINICAL SUSPICION
Serum ESR,
CRP, D-dimer
Infected*


Sinus Tract Present
CLINICAL SUSPICION
LOW and
All negative
Serum ESR,
CRP, D-dimer
Not Infected
Infected*


Sinus Tract Present
CLINICAL SUSPICION
LOW and
All negative
Serum ESR,
CRP, D-dimer
HIGH or
Any Positive
Synovial Fluid Testing
- Synovial WBC
- Positive LE
- Synovial PMN% or Alpha Defensin&
- Synovial Fluid Culture
Not Infected
Infected*


Sinus Tract Present
CLINICAL SUSPICION
LOW and
All negative
Serum ESR,
CRP, D-dimer
HIGH or
Any Positive
Doesn't Meet
PJI Definition
Synovial Fluid Testing
- Synovial WBC
- Positive LE
- Synovial PMN% or Alpha Defensin&
- Synovial Fluid Culture
Meets PJI
Definition
Not Infected
Infected*

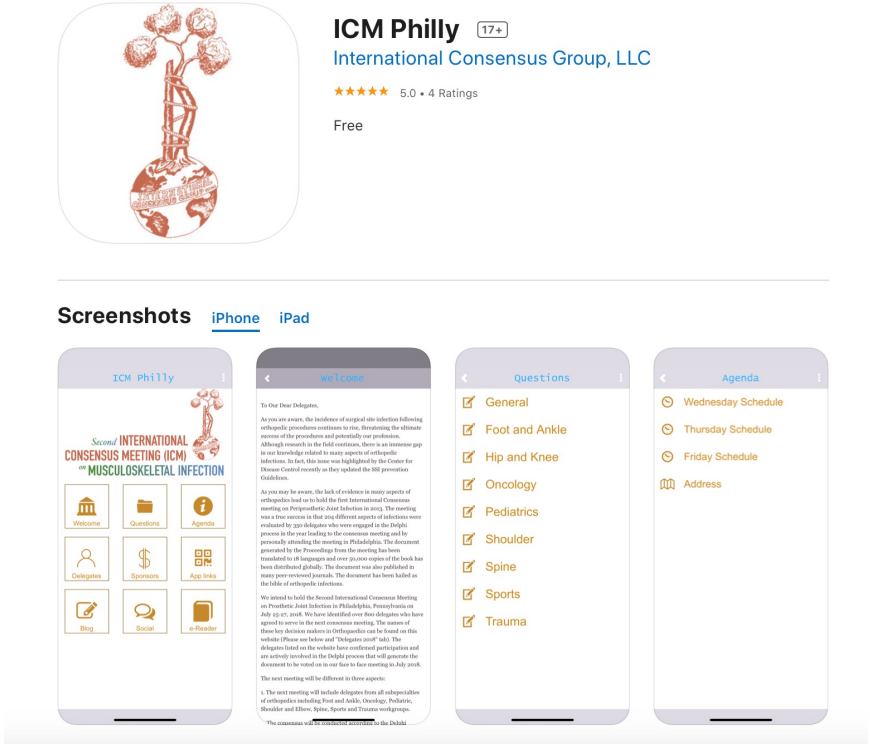

Sinus Tract Present
CLINICAL SUSPICION
LOW and
All negative
Serum ESR,
CRP, D-dimer
HIGH or
Any Positive
Doesn't Meet
PJI Definition
Synovial Fluid Testing
- Synovial WBC
- Positive LE
- Synovial PMN% or Alpha Defensin&
- Synovial Fluid Culture
Meets PJI
Definition
Possible Infection by
Definition or Dry Tap
Revision Surgery Not
Otherwise Planned
Attempt Repeat Aspiration
Dry Tap
Consider further testing with:
1. Nuclear Medicine Scan
2. PET scan
3. Biopsy
Not Infected
Infected*



* At any time, 2 out of 3 out of five cultures with the same organism or sinus tract are major criteria for infection

& Does not need to be performed Routinely

Application



Question: What modifiable and non-modifiable host related factors contribute to an increased risk of SSI/PJI?

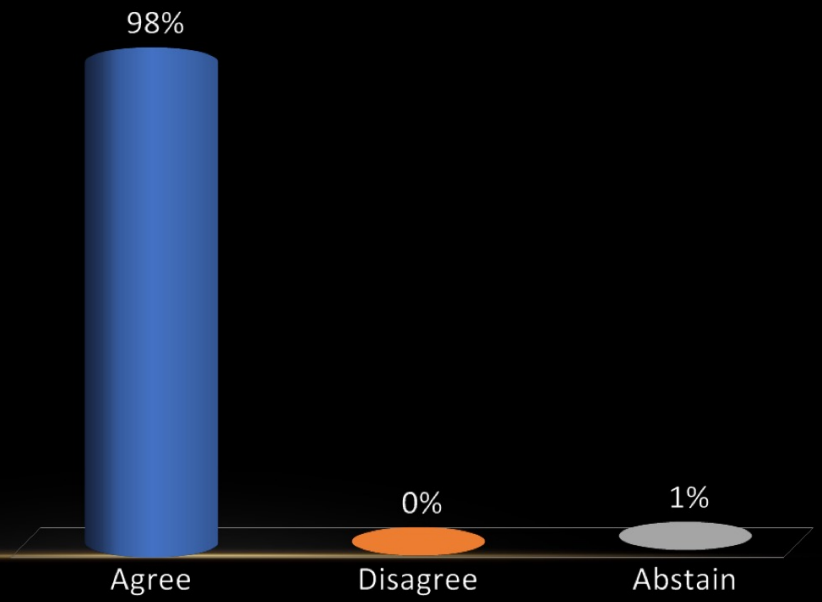
RESEARCHED BY:

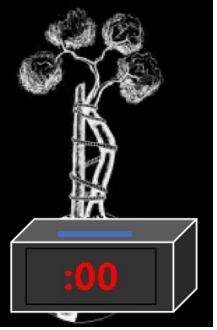
Setor Kunutsor

Recommendation: Modifiable host related factors such as BMI, smoking, alcohol consumption, diabetes, malnutrition and other and certain medical co-morbidities have been shown to increase the risk of SSI/PJI. Non-modifiable factors such as increasing age, male gender, and low-socioeconomic status have also been shown to increase the risk if SSI/PJI.

Level of Evidence: Strong

A. Agree
B. Disagree
C. Abstain



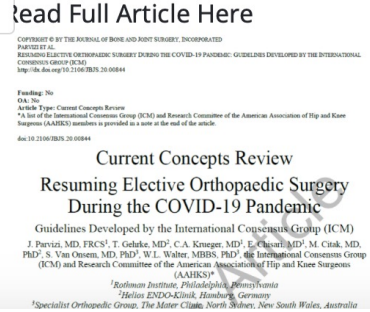


Second INTERNATIONAL CONSENSUS MEETING (ICM) on MUSCULOSKELETAL INFECTION

2018 ICM Meeting Photos

Resuming Elective Surgery During the Pandemic

Read Full Article Here



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PARVIZI ET AL.
RESUMING ELECTIVE ORTHOPAEDIC SURGERY DURING THE COVID-19 PANDEMIC: GUIDELINES DEVELOPED BY THE INTERNATIONAL CONSENSUS GROUP (ICM)
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Current Concepts Review

Resuming Elective Orthopaedic Surgery During the COVID-19 Pandemic

Guidelines Developed by the International Consensus Group (ICM)

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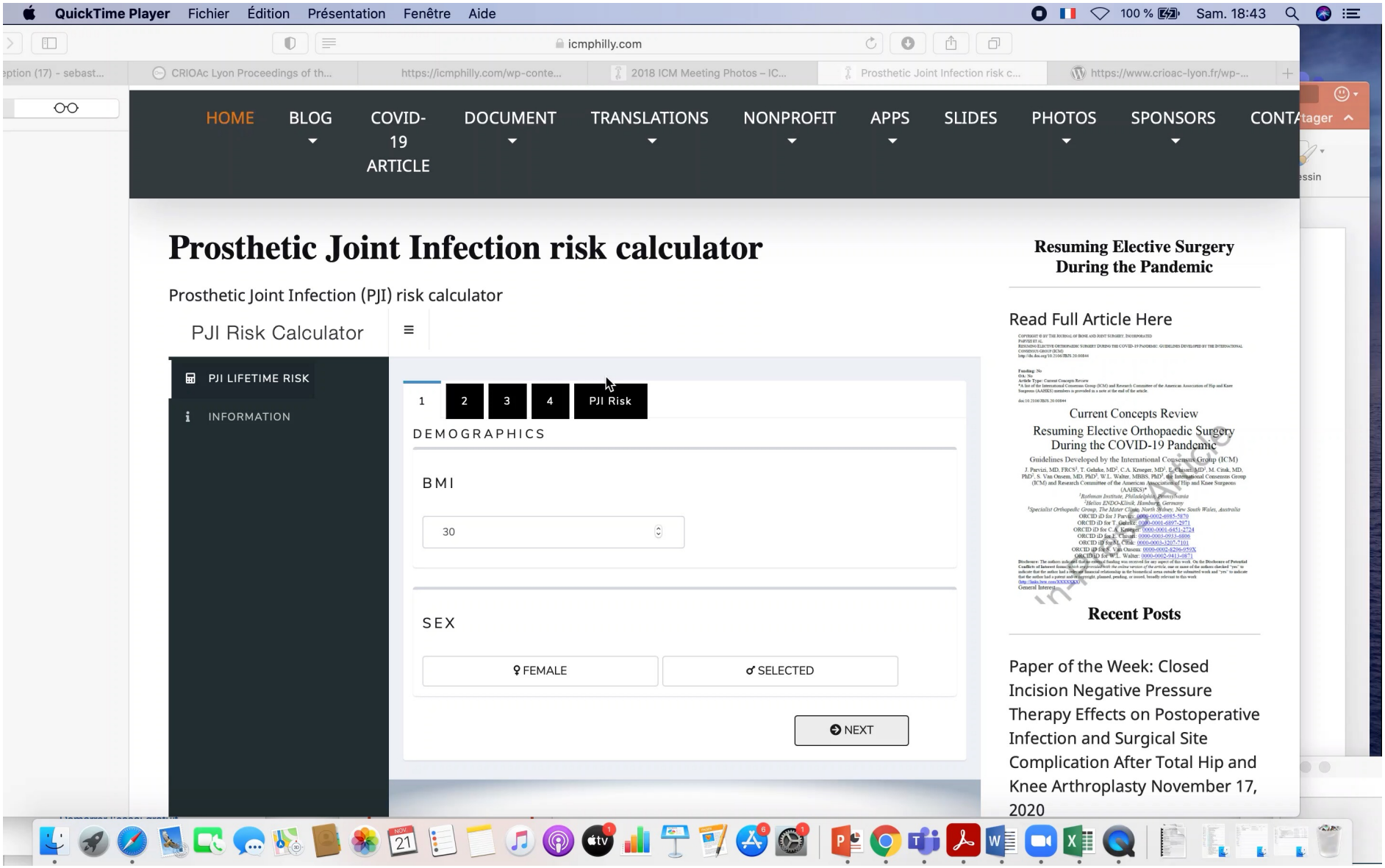
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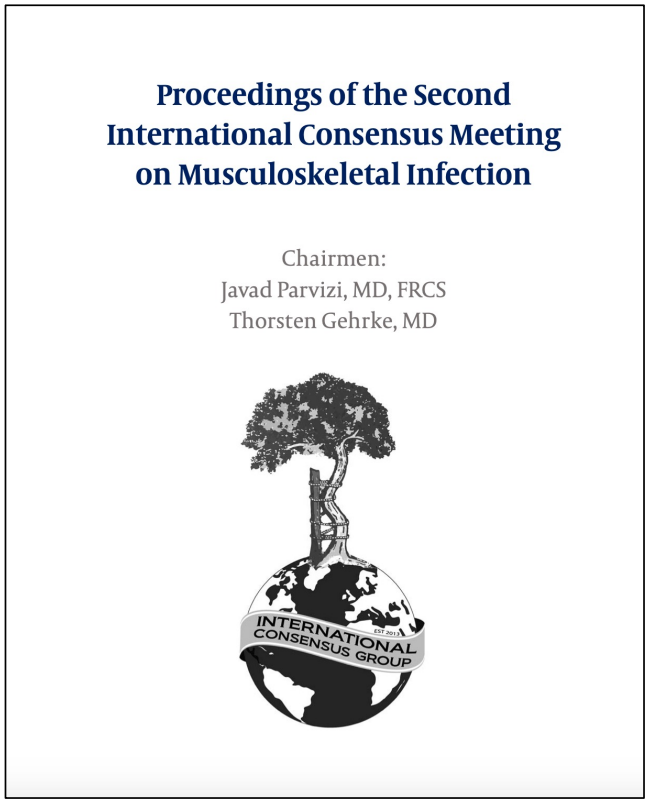

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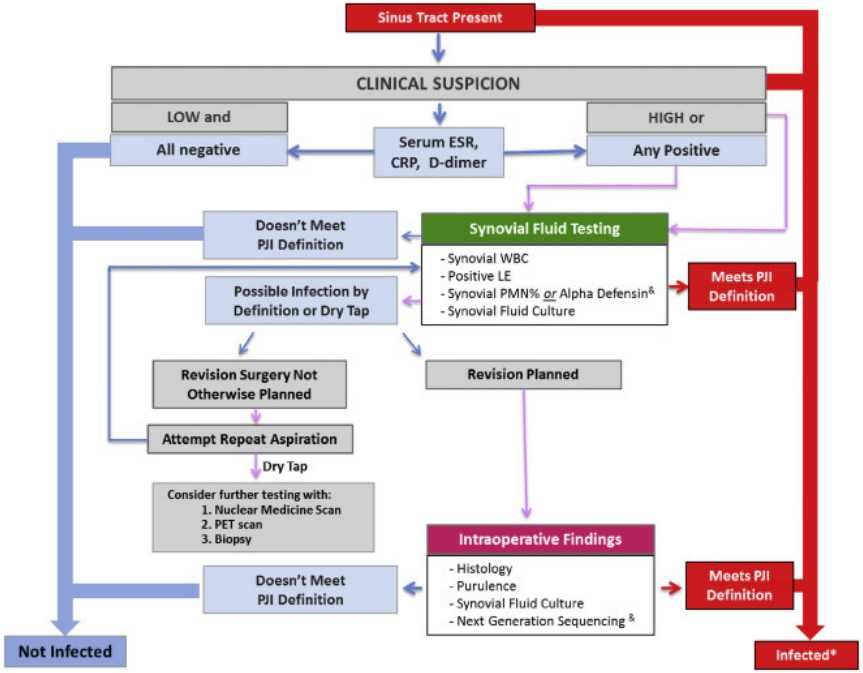
Diagnosis criteria

Major criteria (at least one of the following)	Decision
Two positive cultures of the same organism	Infected
Sinus tract with evidence of communication to the joint or visualization of the prosthesis	

Preoperative Diagnosis		Minor Criteria	Score	Decision
	Serum	Elevated CRP *or* D-Dimer	2	≥6 Infected
		Elevated ESR	1	
	Synovial	Elevated synovial *WBC count or LE*	3	2-5 Possibly Infected [a]
		Positive alpha-defensin	3	
		Elevated synovial PMN (%)	2	0-1 Not Infected
		Elevated synovial CRP	1	

Intraoperative Diagnosis	Inconclusive pre-op score *or* dry tap [a]	Score	Decision
	Preoperative score	-	≥6 Infected
	Positive histology	3	4-5 Inconclusive [b]
	Positive purulence	3	
	Single positive culture	2	≤3 Not Infected

Algorithm



* At any time, 2 out of 3 out of five cultures with the same organism or sinus tract are major criteria for infection
& Does not need to be performed Routinely

Thanks for your attention

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