AEROMEDICAL RECOMMENDATION EXTRAPULMONARY TUBERCULOSIS

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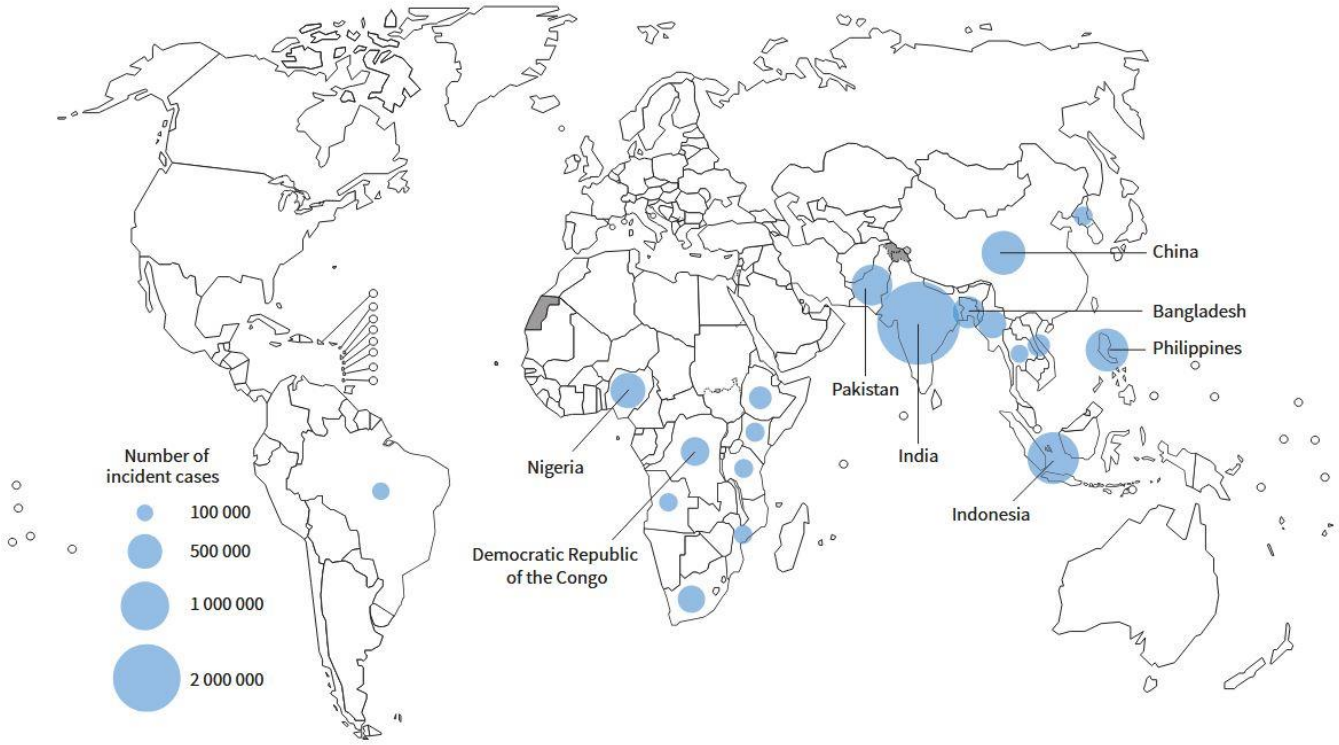
OVERVIEW

- According to WHO in 2023, TB probably returned to being the world's leading cause of death from a single infectious agent, following 3 years in which it was replaced by coronavirus disease (COVID-19), and caused almost twice as many deaths as HIV/AIDS.
- More than 10 million people continue to fall ill with TB every year and the number has been rising since 2021.
- Urgent action is required to end the global TB epidemic by 2030

FIG. 3

Estimated number of incident TB cases in 2023, for countries with at least 100 000 incident cases[a]



[a] The labels show the eight countries that accounted for about two thirds of the global number of people estimated to have developed TB in 2023.

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- Tuberculosis after recovering from COVID-19 is becoming more common, potentially leading to a TB outbreak in the post-COVID-19 era.
- The immunosuppressive nature of the disease and its treatment modalities may contribute to post COVID-19 TB.
- Data were extracted from 21 studies conducted in 13 countries having 33 cases.
- Eleven cases developed EPTB with different sites; pleural TB (five cases), TB lymphadenitis (three cases), Congenital TB (one case), Thyroid TB (one case), and both bone TB and lymphnode TB(onecase)

RESEARCH ARTICLE

Tuberculosis in individuals who recovered from COVID-19: A systematic review of case reports

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Abstract

Background

The emergence of COVID-19 overwhelmed tuberculosis (TB) prevention and control, resulting in a decrease in TB detection rate and an increase in TB deaths. Furthermore, the temporary immunosuppressive effects, lung inflammation, and the corticosteroids used to treat COVID-19, may play a direct role in immunosuppression, leading to reactivation of either previous infection or latent TB or the development of new TB. Thus, the aim of this study was to review TB incidence in individuals who recovered from COVID-19.

Methods

We conducted a systematic search of available databases for previously published studies that reported TB in COVID-19 survivors. The PRISMA checklist was used to guide the review, and the JBI checklist was used to evaluate the study's quality. The descriptive data were summarized.

Results

Data were extracted from 21 studies conducted in 13 countries having 33 cases. The median age was 44 years (range; 13.5–80), and more than half (18, 54.5%) were males. Twelve patients immigrated from TB endemic settings. All 17 patients assessed for HIV were seronegative, and all 11 patients assessed for BCG vaccination status were vaccinated. The majority (20, 69%) of patients had some type of comorbidity with diabetes (12/29) and hypertension (9/29) being the most common. Four patients (30.77%) had a history of TB. Corticosteroids were used to treat COVID-19 in 62.5% (10) of individuals. Dexamethasone, remdesivir, azithromycin, hydroxychloroquine, and enoxaparin were the most commonly used drugs to treat COVID-19. The most common TB symptoms were fever, cough, weight loss, dyspnea, and fatigue. Twenty, eleven, and two patients developed pulmonary, extrapulmonary, and disseminated/miliary TB respectively. It may take up to seven months

Abdominal Radiology
https://doi.org/10.1007/s00261-023-03939-5

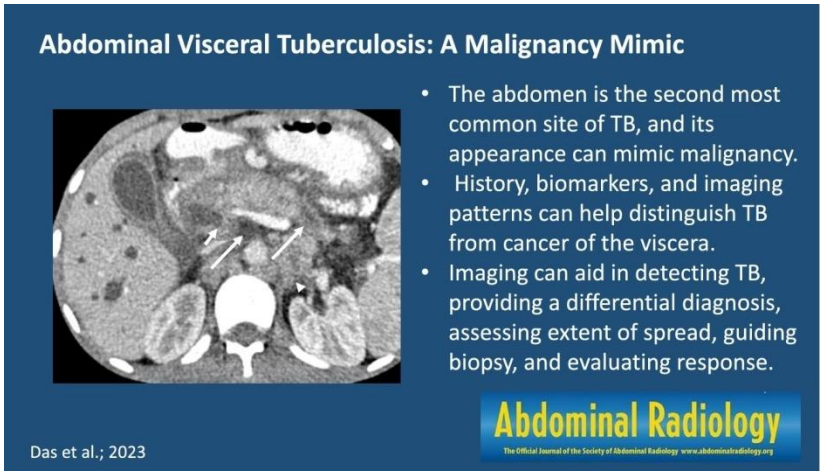
REVIEW

Abdominal visceral tuberculosis: a malignancy mimic

Chandan J. Das[1] · Nikita Rednam[2] · Zainab Vora[1] · Ankita Aggarwal[1] · S. H. Chandrashekhara[1] · Vikas Kundra[2]

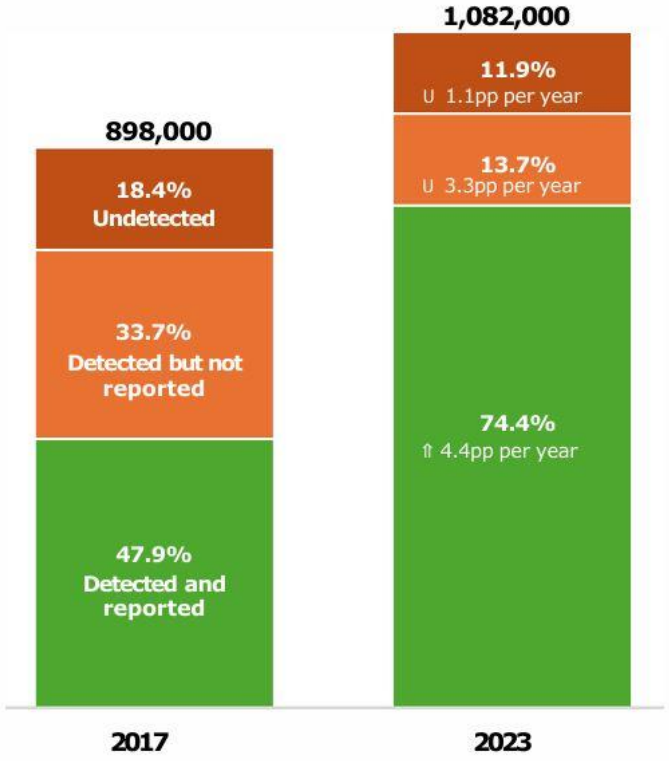
Received: 15 February 2023 / Revised: 18 April 2023 / Accepted: 20 April 2023

Abstract
The purpose is to discuss abdominal tuberculosis mimicking malignancy involving the abdominal viscera. TB of the abdominal viscera is common, especially in countries where tuberculosis is endemic and in pockets of non-endemic countries. Diagnosis is challenging as clinical presentations are often non-specific. Tissue sampling may be necessary for definitive diagnosis. Awareness of the early and late disease imaging appearances of abdominal tuberculosis involving the viscera that can mimic malignancy can aid detecting TB, providing a differential diagnosis, assessing extent of spread, guiding biopsy, and evaluating response.



Under-reporting of TB Cases has decreased and Incidence has not decreased in 2023

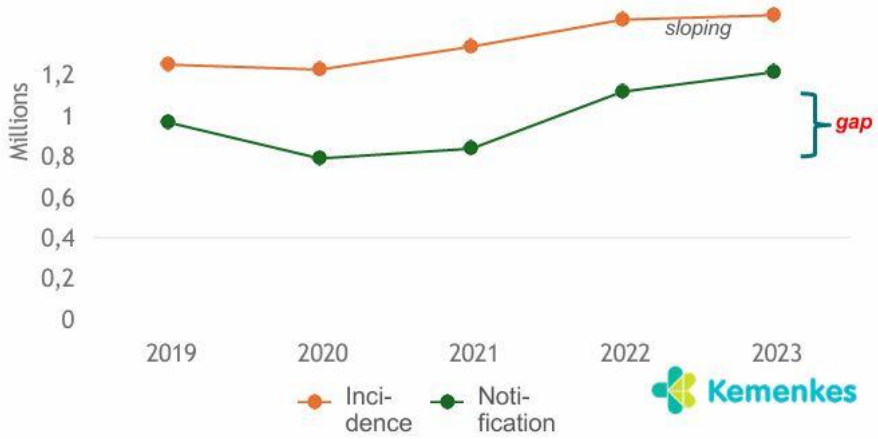
Changes in Composition of TB Cases



Incidence Estimation and Notification Gap in 2023

Statistic	Point Estimation	Interval Estimation
Proportion of **under-reporting**	**15.6%**	13.4% - 18.2%
Proportion of **under-diagnosed**	**13.8%**	7.2% - 20.3%
Incidence (cases)	**1,082,000**	996,000 - 1,171,000
Incidence (per 100,000 population)	**388.1**	357.4 - 420.2

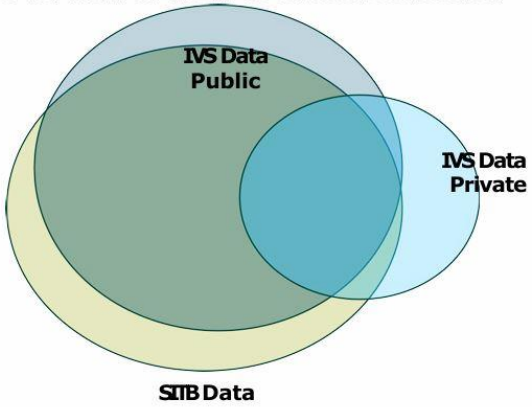
Insidence dan Notification of TB Cases



25.7% point (pp) reduction in under-reporting of TB Cases by 2023

*Compared to **2017** (41.3%), **2023** (15.6%)*

Overview of Total TB Cases Detected



Proportion of **under-reporting *TB Cases***:

*"**Number of TB Cases detected but non reported in** the national surveillance system (**SITB** data)"*

Under-reporting	2017	2023	
Total	**41.3%**	**15.6%**	**↓4.4 pp/yr**
By Health Facilities Ownership			
Public	31.0%	10.7%	↓ 3.4 pp/yr
Private	63.7%	27.5%	6.0 pp/yr
By Age group			
Child (<15)	54.2%	23.5%	↓ 5.1 pp/yr
Adult (15+)	39.3%	14.0%	↓ 4.2 pp/yr
By Types of Health Facilities			
Community Health Center	15.0%	8.1%	↓ 1.2 pp/yr
Non-community Health Center	70.7%	19.6%	8.6 pp/yr
Hospital	62.2%	16.9%	↓ 7.5 pp/yr
Clinic, Private Practitioner, Lab	95.9%	37.6%	**↓ 9.7 pp/yr**
By Anatomical Sites			
Pulmonary	38.3%	14.7%	↓ 3.9 pp/yr
Extrapulmonary	58.1%	20.3%	↓ 6.3 pp/yr
By Diagnosis Types			
Bacteriological Confirmation	20.6%	7.7%	↓ 2.2 pp/yr
Clinical Diagnosis	55.3%	20.6%	↓ 5.7 pp/yr

Kemenkes

CASE STUDY

1. Name : Captain GS
2. Sex : Male
3. Age : 54 y.o
4. License : ATPL (1st class) B737 classic for cargo operation
5. MEDEX : Renewal (21/11/2022)

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HISTORY & PHYSICAL EXAMINATION

Date / Location	21 November 2022 / Aviation Medical Center
Main Complain	None, applied for renewal medical certificate on 21 November 2022.
Previous medical history	Bronchopneumonia Nov 2020 COVID-19 (+) Feb 2022 Hypertension (+) since 5 years ago Weight loss (-)
Family History	DM (+)
Social History	Previously smoking (stopped more than10 years ago)
Physical Examination	BP 130/80 mmHg BMI 25,99

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	2018		2019		2020			2021		2022	
Pemeriksaan	24 Jan	25 Juli	22 Jan	23 Juli	14 Jan	23 Juli	24 Nov	25 Mei	25 Nov	27 Mei	21 Nov
Darah lengkap											
Leukosit	4,03	6,78	5,47	6,18	5,46	5,76	6,05	7,22	6,46	7,87	5,36
Neu	63	65	60	61	66	65	64	64	67	66	69
Lymph	24	24	26	23	27	25	23	25	2	21	14
Mono	11	9	11	12	6	9	12	9	22	11	13
Eos	2	1	2	2	1	0	1	2	8	1	0
Baso	0	1	1	2	0	1	0	0	1	1	4
LED	7	35	23	10	8	16	8	28	17	56	56
Eritrosit	5,31	5,55	5,16	5,40	5,26	5,12	5,55	5,33	5,28	5,61	5,11
Hemoglobin	15,2	15,6	14,8	15,6	16	14,1	15,9	14,4	15,6	14,6	12,9
Hematokrit	46,5	47,5	44,1	46,3	45,7	44	48,8	45,6	45,3	48,3	43,0
Trombosit	188	253	227	219	210	220	209	273	234	251	244
Kimia darah											
Gula darah	94	95	96	106	101	91	111	113	112	104	123
Kolesterol	194	204	229	200	212	234	225	197	229	243	242
HDL	28	34	47	31	39	39	29	28	33	25	36
LDL	131	136	157	158	152	147	156	154	152	143	204
Trigliserida	178	192	222	211	191	201	208	137	184	146	133
Ureum	28.40	27.40	32.60	28.90	38	24,40	28,20	24,6	33,7	33,2	38,70
Kreatinin	1.38	1.35	1.09	1.42	1,51	1,1	1,13	1,05	1,26	1,40	1,64
GFR	54,5	55,9	71,3	52,6	52,8	70,3	68,1	74,2	60,1	53,2	54
Asam urat	9.12	7.76	7.01	6.16	5,47	7,05	8,18	5,36	6,16	6,44	6,58
SGPT	53	32	52	82	77	67	94	144	68	65	29
SGOT	29	21	29	36	38	24	40	61	31	26	16

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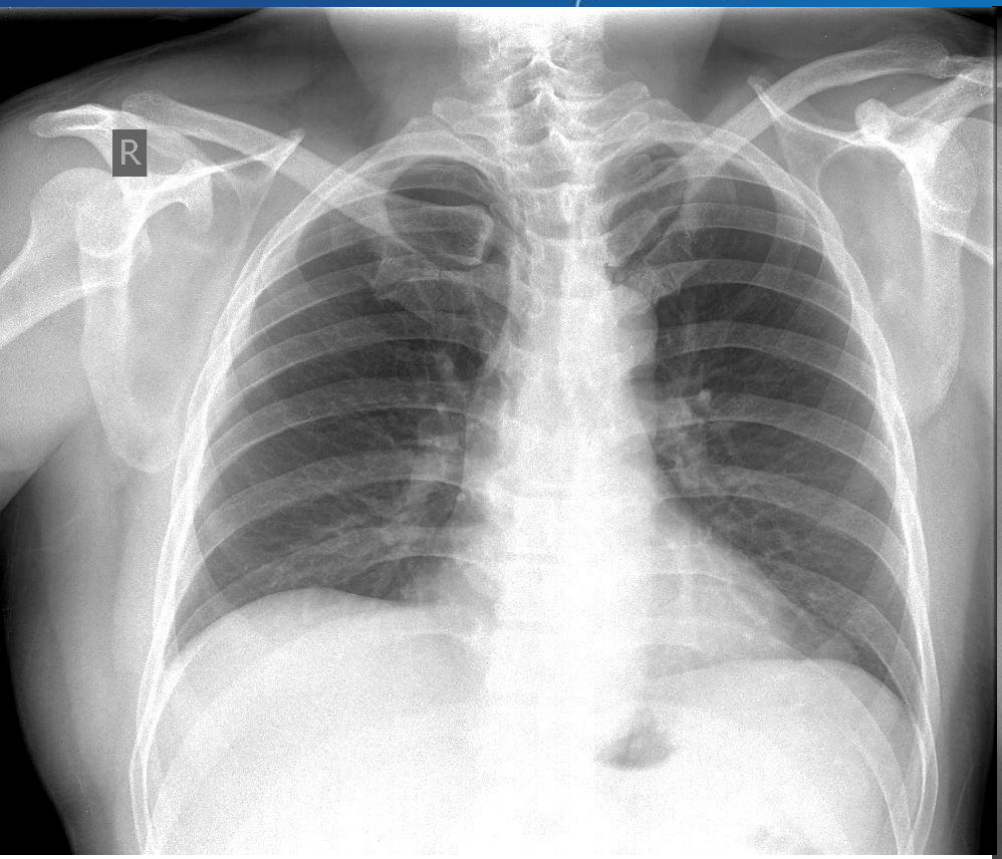
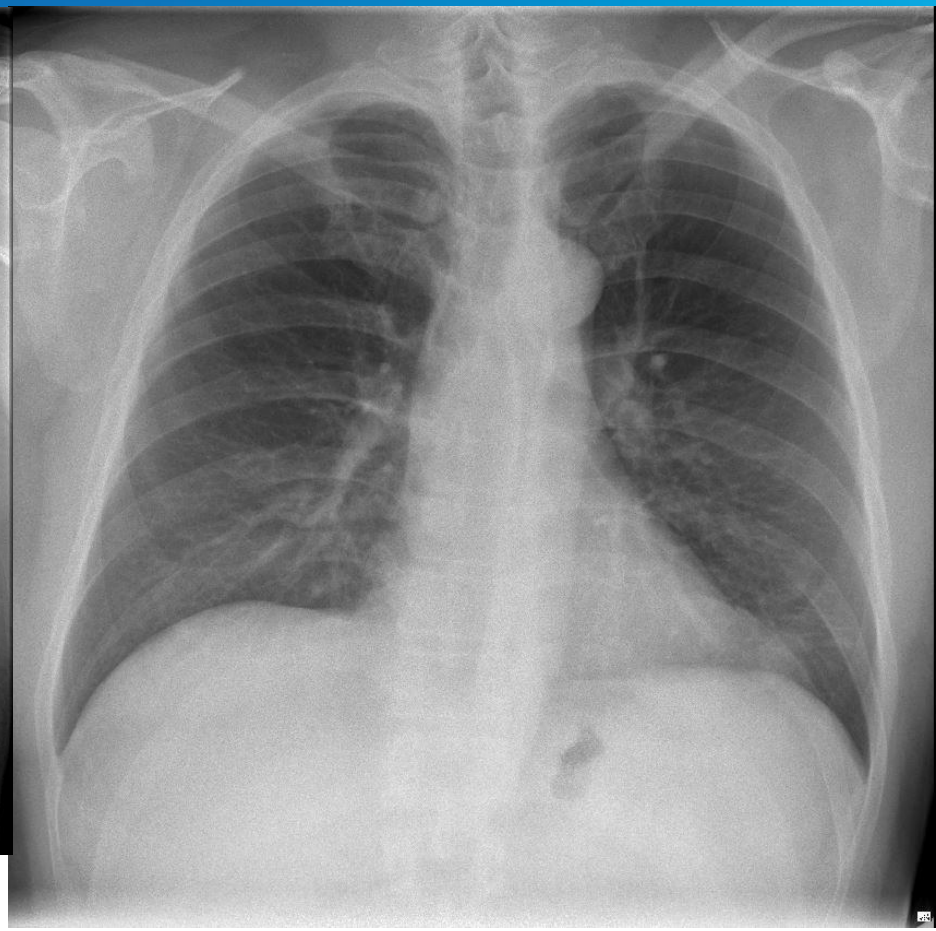
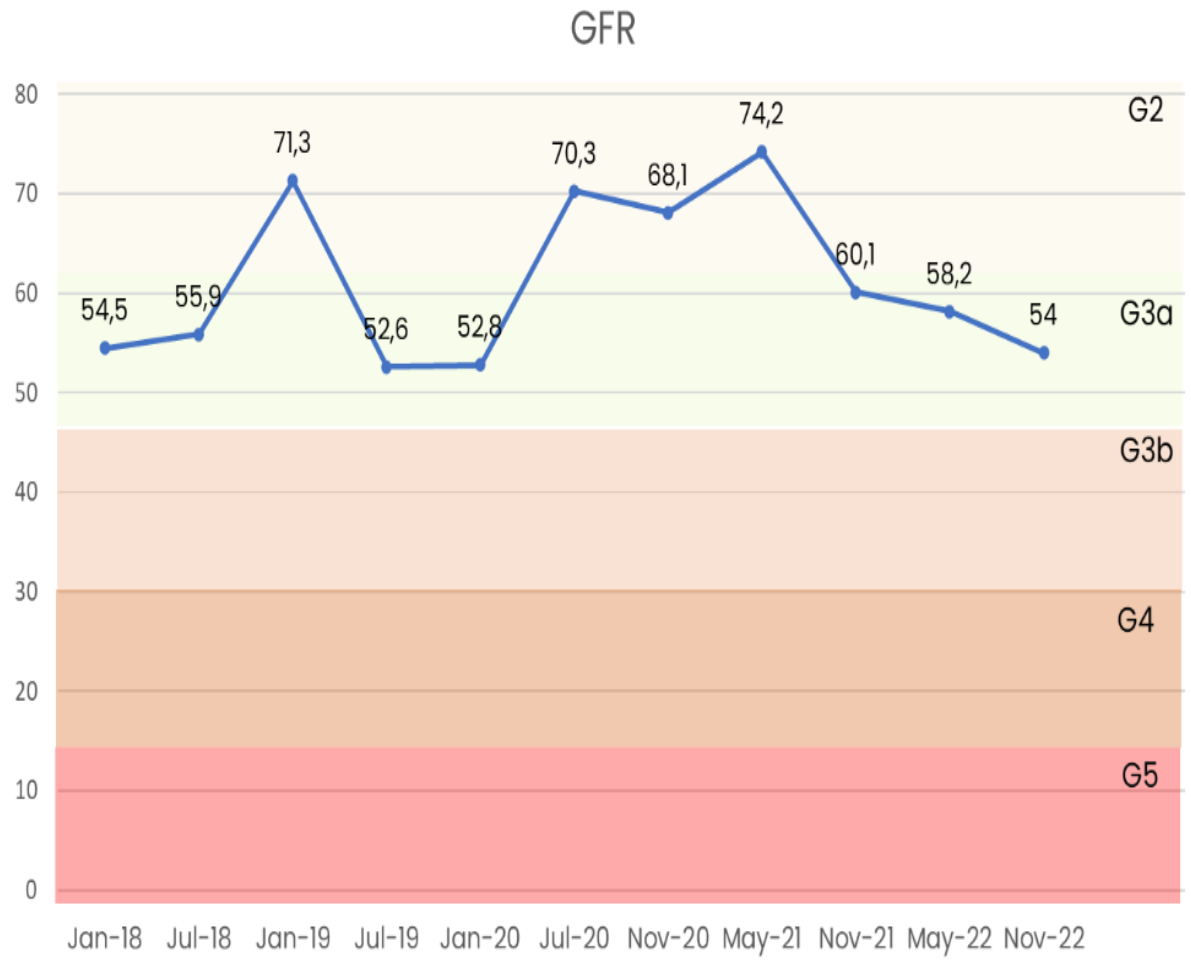
	2018		2019		2020			2021		2022	
Urinalisis	24 Jan	25 Juli	22 Jan	23 Juli	14 Jan	23 Juli	24 Nov	25 Mei	25 Nov	27 Mei	21 Nov
Makroskopis											
Warna	Kuning	Kuning	Kuning	Kuning	Kuning	Kuning	Kuning	Kuning	Kuning	Kuning	Kuning
Kejernihan	Jernih	Jernih	Jernih	Jernih	Jernih	Jernih	Jernih	Jernih	Jernih	Keruh	Jernih
BD	1.020	1.020	1.020	1.021	1.021	1.013	1,010	1,017	1,020	1,015	1,010
pH	5.0	5.0	5.0	6.0	6.0	6.0	6,0	6,0	6,0	6,0	6,0
Protein	-	-	-	-	-	-	-	-	-	+2	+1
Reduksi	-	-	-	-	-	-	-	-	-	-	-
Leukosit	-	-	-	-	-	-	-	75	-	+3	+1
Eritrosit	-	-	-	-	-	-	-	-	-	+1	+1
Billirubin	-	-	-	-	-	-	-	-	-	=	-
Urobillinogen	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Keton	-	-	-	-	-	-	-	-	-	-	-
Nitrit	-	-	-	-	-	-	-	-	-	-	-
Mikroskopis											
Leukosit	0.90	5.04	2.45	8.71	9.47	4.43	8,15	43,33	3,5	2427	132
Eritrosit	3.71	0.74	0.14	0.88	0.83	0.59	0,81	1,60	1,8	127	121
Ephitel	3.2	4.0	6.0	8.1	7.2	6.1	6,8	31,0	2,2	-	-
Kristal	0.348	3.364	2.32	5.017	1.537	1.595	-	9,686	9,04	-	1
Silend	-	-	-	-	-	-	-	-	-	-	-
Bakteri	4.6	1.8	8.8	23.9	13.2	6.1	11,4	25,6	-	-	-
Jamur	-	-	-	-	-	-	-	-	-	-	-
Lendir	-	-	-	-	-	-	-	-	-	-	-
Lainnya	-	-	-	Vit.C 20	Vit.C 40	-	-	-	Vit. C.40	-	Vit. C 40



CXR NOV 2020



CXR NOV 2022



Category	GFR	Terms
G1	≥ 90	Normal or high
G2	60-89	Mildly decreased*
G3a	45-59	Mildly to moderately decreased
G3b	30-44	Moderately to severely decreased
G4	15-29	Severely decreased
G5	< 15	Kidney failure

ABDOMINAL USG 27/5/2021	**ABDOMINAL USG** 31/10/2022
• Mild to moderate fatty liver, with cystic lesion in the left lobe, DD/ simple cyst •Cystic lesion in the med cortex left kidney, DD/ Simple cyst (Bosniak 1)	• Nephrolithiasis dextra ± 4,01 mm • Hydronephrosis sinistra ringan (Grade 1) • Cystitis

CT Urografi- Dual Source Flash (contrast) 10 Nov 2022

a) Susp. granulomatous disease (appendicitis, colitis, multi focal calcified lesion in anterior spleen, pancreatic head, peripancreatic body, upper mesenterial left quadrant and paraillica left)

b) Slightly enchanced solid lesion along distal left ureter (DD/ neoplasm, inflammation)

c) Susp. nephritis left (multifocal less enhancement are in cortex-medullary)

d) Susp. Multiple calyceal nephrolithiasis (non obstructive) in left lowerpole sinistra.
(3 buah, terbesar 0,35x0,38 cm)

e) Susp. seminal vesiculitis DD/ Neoplasm (area less enhancement in left vesicula seminalis)

f) Susp. cholecystitis dengan cholecystolithiasis (± 0,45 x 0,47 cm).

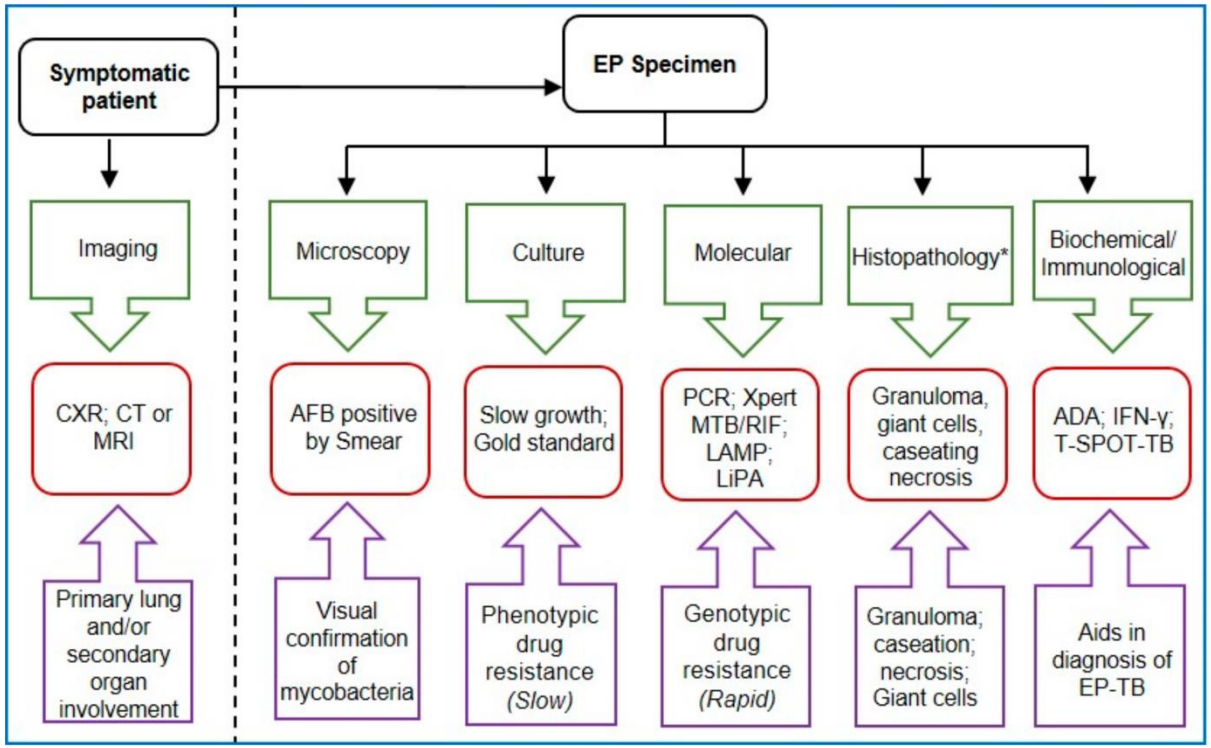
g) Spondylosis thoracolumbar.

Date	Specialist	Consultation
27/5/2021	Internal Medicine	S: Lab with transaminitis O: Anti HAV IgG reaktif Anti HAV IgM Non reactive A: - Steatohepatitis (USG) - Renal simple cyst P: Oral Hepatoprotector
16/11/2022 (one week before medical)	Urologist 1st	S: Pain on urination O: CT Urography Slightly enchanced solid lesion along distal left ureter A: Susp tumor ureter P: - Oral tamsulosin HCl -Oral solifenacin succinate - Elective urological endoscopy biopsy & PA

Date	Specialist	Consultation
24/12/2022	Pulmonologist	S: Susp.immunocompromised O: MSCT Thorax (susp old process) A: Urogenital Tuberculosis P: Oral Pro TB4 1x 5tab rifampicin 150mg, isoniazid 75 mg, pirazinamid 400mg, ethambutol 275 mg
27/12/2022	Nephrologist	S: Susp.immunocompromised O: - CD4 absolut 296 sel/uL -Screening anti-HIV (ECLIA method) non reactive A: Immunocompetent P: Continue GUTB theraphy

Date	Specialist	Consultation
9/6/2023	Urologist 2nd	S: Monitoring GUTB 6 month O: Abdominal X-Ray (KUB) A: Urogenital Tuberculosis P: rifampicin & ureter stent
7/12/2023	Urologist 2nd	S: History of stricture left ureter O: -USG urology within normal limit Stent (+) - eGFR (CKD EPI-Creatinine) 64 A: Abnormal kidney function test P: Removal of ureter stent Feb 2024

- urine Mtb culture tests with a sensitivity and specificity of 23.3% and 100%,
- PCR tests (urine samples) sensitivity and specificities of 88.6% and 96.5%
- sXpert MTB/RIF in detecting GUTB using urine samples ensitivity and specificity of 87% and 91%



No.	Diagnosis
1.	TB urogenital
2.	Nephrolithiasis sinistra multipel (3 buah) pada lowerpole renal dengan hidronephrosis ringan (terbesar 0,35x0,38 cm)
3.	Acute kidney injury
4.	Cholecystolithiasis (0,45 x 0,47 cm)
5.	Appendicitis kronis
6.	Susp. TB abdomen
	Tata Laksana
1.	Pro TB 4 1x5 tab
2.	Kontrol 2 minggu.

Type	Clinical features	Imaging findings	Differential diagnoses
Hepatic tuberculosis	Hepatomegaly, abdominal pain, jaundice, fever, and weight loss	Focal/ diffuse, miliary/macrnodular Serohepatic variant (rare) Late: calcifications, architectural distortion	Primary malignancy or metastatic disease, fungal infections, sarcoidosis, and rarely, leukemia and lymphoma and other granulomatous infections such as brucellosis
Splenic tuberculosis	Splenomegaly Abdominal pain	Micronodular and/or macronodular nodules, sometimes splenomegaly Late: calcifications, architectural distortion	Metastatic disease, leukemia or lymphoma, sarcoidosis, hemangioma, cyst, and fungal infection
Gallbladder tuberculosis	Right upper quadrant pain, mass, anaemia	Nodule, mass or circumferential thickening of the GB Late: calcifications, architectural distortion	Carcinoma, chronic cholecystitis, and xanthogranulomatous cholecystitis
Biliary tuberculosis	Abdominal pain, hepatomegaly, jaundice, fever, and chills	Multifocal biliary strictures with/without intervening sections of dilatation Extrahepatic biliary duct involvement is rare Late: calcifications	Cholangiocarcinoma, primary sclerosing cholangitis, inflammatory/sclerosing cholangiopathies, IgG4-related strictures, AIDS cholangiopathy, recurrent pyogenic cholangitis
Pancreatic tuberculosis	Epigastric pain, nausea, vomiting, mass, diarrhea, jaundice	Diffuse involvement of the pancreas or multifocal or solitary focal lesions, peripancraetic necrosis Late: calcifications, architectural distortion	Pancreatic carcinoma, pseudocyst, chonic pancreatitis
Kidney ureter bladder (KUB) tuberculosis	Increased urinary frequency, dysuria and flank pain	Parenchymal tuberculoma in kidney, papillary necrosis, renal calcifications, phantom calyx, Kerr's kink, irregular asymmetrical urothelial enhancement Pipe stem ureter Asymmetrical wall thickening of UB, thimble bladder	Xanthogranulomatous pyelonephritis, renal cell carcinoma, metastases, lymphoma, urothelial carcinoma

AEROMEDICAL CONCERN

Incapacitation Risk of Abdominal TB

- The majority (21 per cent) of in-flight medical and incapacitation events in Australian civil pilots for the study period were due to acute gastrointestinal illness (ATSB 2007)
- Half of the incapacitation occurrences were related to gastrointestinal illnesses (ATSB 2016)

RENAL CALCULI

- **Effect of aviation on condition**

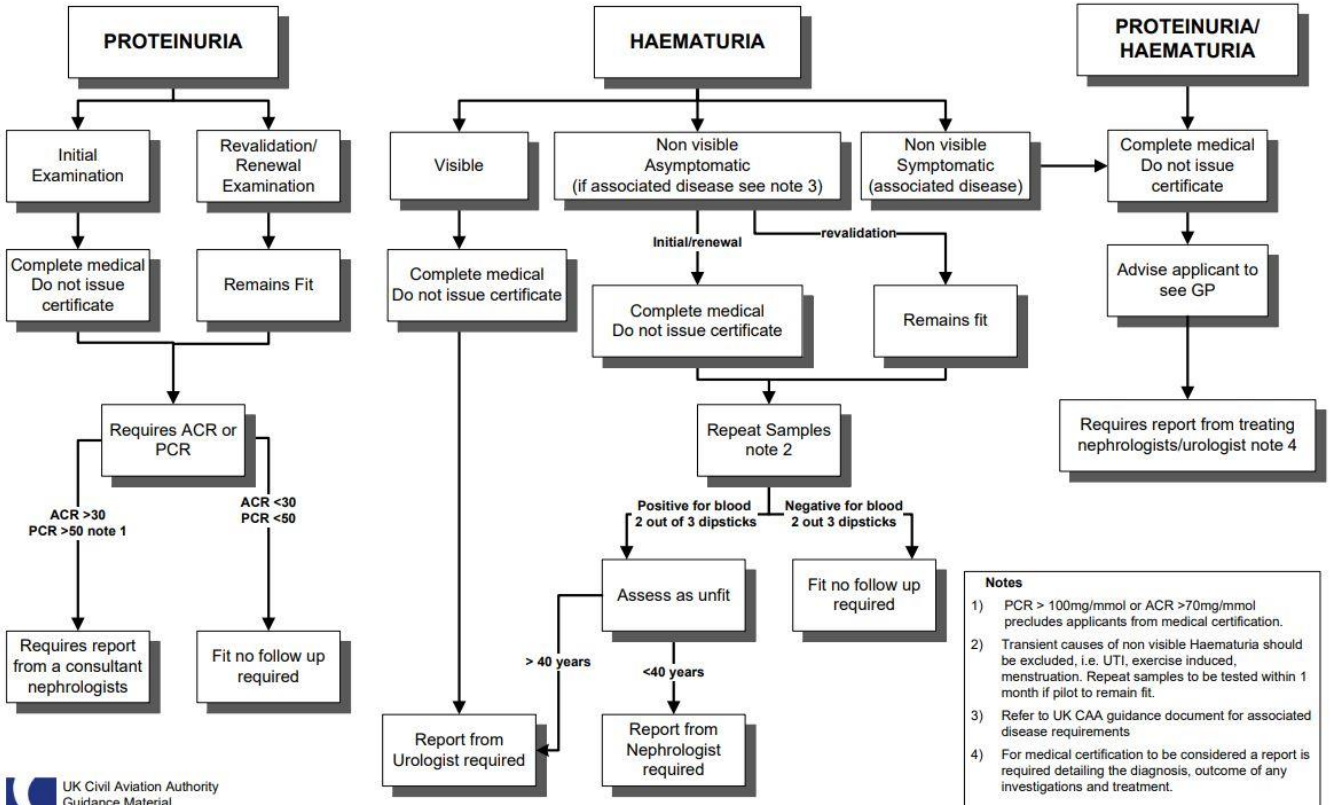
Low fluid intake, especially in hot conditions

Effect of condition on aviation

- Overt incapacitation from severe pain and vomiting
- Distraction due to treatment and symptoms
- High recurrence rate of calculi

Medicine	Daily Dose (mg/KgBB/day)	Maximum Dose (mg/day)	Side Effect
Isoniazid	10	300	Hepatitis, peripheral neuritis, hypersensitivity
Rifampisin	15	600	GI disorders, skin reaction, thrombocytopenia, transaminitis, discoloration of bodily fluid
Pirazinamid	35		Hepatotoxicity, arthalgia, GI disorders
Etambutol	20		Optical neuritis, decreased visual acuity, color blind, hypersensitivity, GI disorders

Class 1/2 Certification – Abnormal Urinalysis

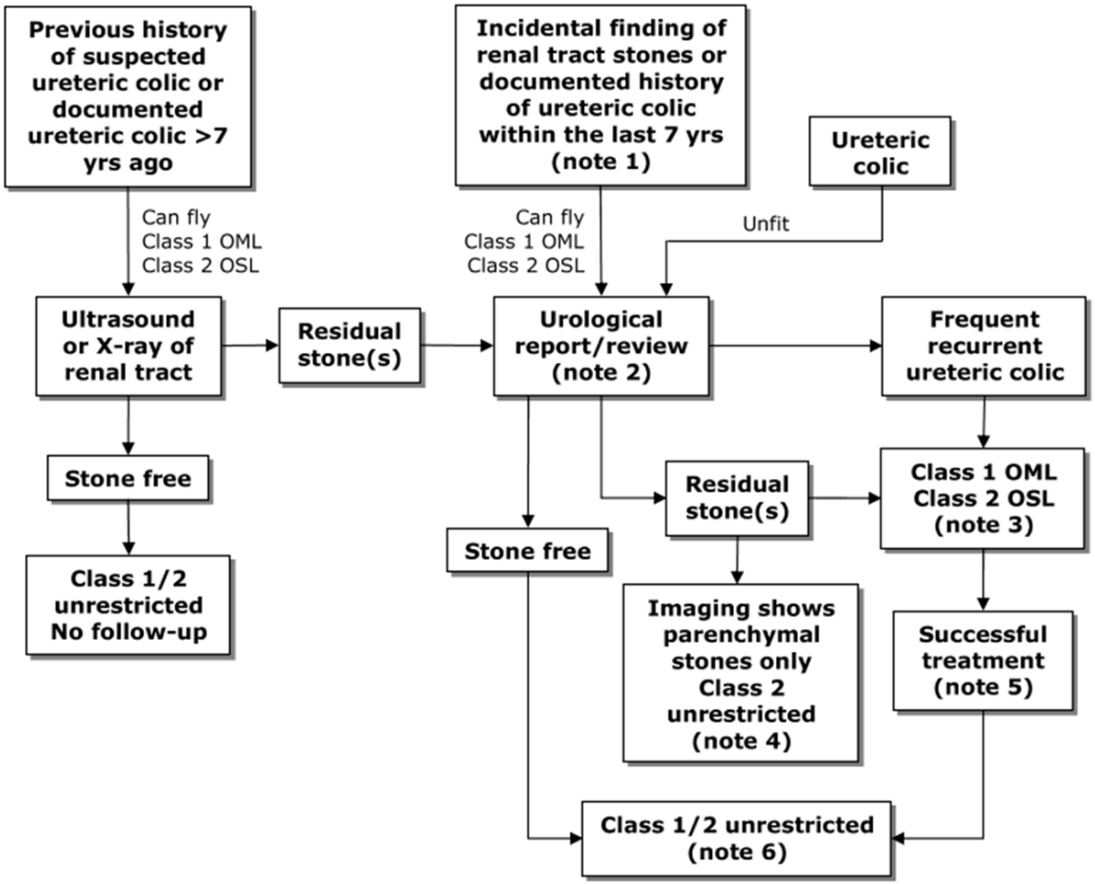


Notes

1) PCR > 100mg/mmol or ACR >70mg/mmol precludes applicants from medical certification.
2) Transient causes of non visible Haematuria should be excluded, i.e. UTI, exercise induced, menstruation. Repeat samples to be tested within 1 month if pilot to remain fit.
3) Refer to UK CAA guidance document for associated disease requirements
4) For medical certification to be considered a report is required detailing the diagnosis, outcome of any investigations and treatment.

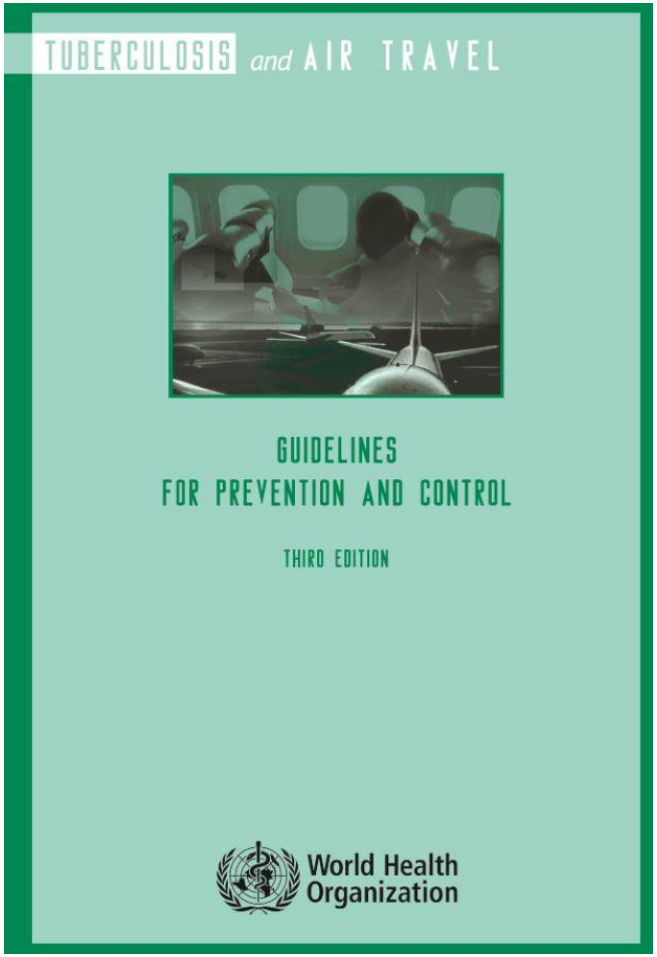
UK Civil Aviation Authority
Guidance Material
Version 1.2 18/11/2013
www.caa.co.uk/medical

PLEASE PRINT THIS DOCUMENT AND TAKE TO YOUR SPECIALIST ADVISOR


Previous history of suspected ureteric colic or documented ureteric colic >7 yrs ago
Can fly
Class 1 OML
Class 2 OSL
Ultrasound or X-ray of renal tract
Residual stone(s)
Stone free
Class 1/2 unrestricted No follow-up
Incidental finding of renal tract stones or documented history of ureteric colic within the last 7 yrs (note 1)
Can fly
Class 1 OML
Class 2 OSL
Ureteric colic
Unfit
Urological report/review (note 2)
Frequent recurrent ureteric colic
Stone free
Residual stone(s)
Class 1 OML
Class 2 OSL
(note 3)
Imaging shows parenchymal stones only
Class 2 unrestricted
(note 4)
Successful treatment
(note 5)
Class 1/2 unrestricted
(note 6)

CONTACT TRACING

- When the infectious source is a crew member (cabin or flight crew), an assessment of individual work assignments should be made.
- All other crew with a cumulative exposure of 8 hours or longer during the period when the crew member with TB was potentially infectious should be informed of their exposure and advised to seek medical evaluation.
- Crew members would be considered close contacts if they were exposed to the infectious source while working, travelling and socializing together.
- The risk assessment should also consider whether any other work colleagues would alsomeet the criteria for close contact.



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Air-travel related TB incident follow up – effectiveness and outcomes: a systematic review

Laura Maynard-Smith, Colin Stewart Brown, Ross Jeremy Harris, Peter Hodkinson, Surinder Tamne, Anderson Sarah Ruth, Dominik Zenner

ABSTRACT

Background

The World Health Organization (WHO) recommends following up passengers following possible exposure to a case of infectious tuberculosis (TB) during air travel. This is known to be time consuming and difficult, and increasingly so with higher numbers of flights and passengers to and from countries with high TB endemicity each year.

Objectives

This paper systematically reviews the literature on contact tracing investigations following a plane exposure to active pulmonary TB. Evidence for in-flight transmission was assessed by reviewing the positive results of contacts without prior risk factors for latent TB.

Results

Twenty-two papers were included, with a total of 469 index cases and 15,889 contacts. Only 26.4% of all contacts identified completed screening following exposure. The yield of either a single positive tuberculin skin test (TST) or a TST conversion attributable to in-flight transmission is between 0.19% (95%CI 0.13-0.27) and 0.74% (95%CI 0.61-0.88) of all contacts identified (0.00%, 95%CI 0.00-0.00 and 0.13%, 95%CI 0.00-0.61 in random effects meta-analysis).

Conclusions and implications of key findings

The evidence behind the criteria for initiating investigations is weak and it has been widely demonstrated that active screening of contacts is labour intensive and unlikely to be effective. Based on our findings, formal comprehensive contact tracing may be of limited utility following a plane exposure.

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UNFIT

Nov 2020
- Abnormal CXR
- Susp. Broncho-pneumonia

May 2021
- Abdominal USG
- Cystic lesion in the med cortex left kidney
- Mild to moderate fatty liver, with cystic lesion in the left lobe

Feb 2022
- PCR SARS-CoV2
- Positive COVID

Oct 2022
- Urology USG
- Nephrolithiasis dextra
- Left Hydronephrosis
- Cystitis

Nov 2022
- CT Urography
- Susp granulomatous disease
- solid lesion along distal left ureter

Dec 2022
- MSCT Thorax non contrast
- Suggestive old process
- PCR Urinary TB (+)
- R/ Pro TB4

Jun 2023
- Ureter Stent
- Rifampicin

FIT

Dec 2023
- End of TB Therapy
- USG Urology Normal
- e-GFR 64

ICAO 80
SAFE SKIES.
SUSTAINABLE FUTURE.

THANK YOU