状で発症する．下痢の回数は多様だが，免疫能が正常であれば，長くとも2週間程度で自然に回復する．しかし，免疫不全者の場合は，感染しやすいうえ，慢性化し再発を繰り返すことが多い．CD4数が重症度に影響し，重症化した場合は大量の水様便による脱水と電解質異常が補正できず致死的となることもある．

ジアルジア症での胆管・胆嚢炎などの合併は，免疫不全者で多くみられるが，免疫系に異常を認めない例での報告例もある[17]．重症な下痢を示さず慢性の肝胆道系症状で，ジアルジア感染が明らかになった例は日本国内でも報告されている[18]．一方，クリプトスポリジウム症では，免疫不全者の例を除き感染が慢性化することはなく，肝胆道系合併症も，激しい下痢を示す感染者の小腸内で増殖したクリプトスポリジウム原虫が胆管内の上皮にも影響を及ぼすことによる．米国の報告でも，エイズでみられる胆道系病変の病原体として，クリプトスポリジウム原虫は，サイトメガロウイルスと並んで多いとされている[5]．

消化管原虫症の確定診断は，新鮮な下痢便の直接塗抹標本を顕微鏡で観察し，病原体を確認することが基本にある．ジアルジア症では，糞便中に嚢子か栄養体を同定するか，十二指腸や胆汁中に栄養体を同定することでなされる．嚢子は下痢・有形便ともに検出可能で，ホルマリン・酢酸エチル遠心沈殿法(MGL変法)などの集嚢子法にヨード染色法を併用することで検出率が高くなる．嚢子の排出は間欠的なために，数日間，検査を繰り返すのが望ましい．クリプトスポリジウム症の確定診断は糞便中のオーシストを検出することによる．通常の塗抹標本観察では原虫の確認が困難な場合もあり，遠心沈殿法やショ糖浮遊法により集オーシストを行い，蛍光抗体染色や抗酸染色などの染色標本を作製するとよい．ランブル鞭毛虫の嚢子やクリプトスポリジウムのオーシストを検出する際，蛍光抗体染色が最も感度がよい検査法で，海外では簡便な染色用キットも市販されている．また，嚢子やオーシストの内部構造観察には，微分干渉顕微鏡が適している．

その他，日本国内での報告例はほとんどないが，エイズなど免疫不全で胆道系合併症を起こす原虫や類縁生物として，イソスポーラ原虫(*Isospora belli*)やミクロスポリジア(microsporidia)などが知られている．これらの病原体による胆道病変の診断には，分子生物学的手法や免疫組織学的手法を用いた局在診断が必要なこともあり，診断・治療に難渋することが多い[19-21]．

4. 治療と予後

他の原因による胆道閉塞性病変と同じく，著しい閉塞性黄疸に対しては，経皮的・経胆道的なドレナージが行われる．胆道系の広い範囲に赤痢アメーバ性肝膿瘍や包虫性肝嚢胞が穿破した場合は，ショックに陥り重篤な病態になることもあり，時機を逸しない外科的処置が必要になることも多い[3,4]．下痢に対する水分補給，貧血に対する鉄剤投与といった支持的療法も重要だが，基本は，原因となっている寄生虫症の治療である．寄生虫症の治療については，‘寄生虫症薬物治療の手引き改訂(2010年)第7.0版’に詳しく，本稿中で触れたものについては表にしてまとめた[22](**表2**，**3**)．この‘手引き’には，各寄生虫症の病態や検査・診断についても概略が説明されており，たいへん参考になるが，日本寄生虫学会や厚労科研・ヒューマンサイエンス振興財団政策創薬総合研究事業‘熱帯病治療薬研究班(略称)’(http://www.med.miyazaki-u.ac.jp/parasitology/orphan/index.html)からダウンロードできる．使用の実際にあたっては，上記ホームページなども利用しながら，更に詳細な情報の入手に努めて頂きたい．日本国内での寄生虫症に対する治療薬は，国内承認薬で該当する寄生虫症に保険適応があるもの，国内承認薬だが保険適応がないもの，国内未承認薬だが効果が報告され国際的には評価が定まっているものなど，混乱しているので，実際に使用する際には注意が必要である．また，クリプトスポリジウム症など免疫不全が背景にある場合は，エイズに対するHAARTなど，免疫機能の改善を目指した治療も強化しなければならない．

表2 肝外胆道寄生原虫症に対する治療

	国内で市販されている薬剤の使用例(ただし，保険は未承認)	国内で市販されていない薬剤の使用例("研究班"に依頼)
赤痢アメーバ症		
アメーバ性大腸炎	メトロニダゾール経口剤(フラジール) 1,500-2,000 mg/日，分3，7日間 チニダゾール経口剤(ハイシジン) 1,200 mg/日，分3，5日間	メトロニダゾール治療に応答しない場合 パロモマイシン(Humatin) 1,500 mg，分3，10日間
アメーバ性肝膿瘍	メトロニダゾール経口剤 1,500-2,000 mg/日，分3，10日間 チニダゾール経口剤 2,000 mg/日，分3，7日間	メトロニダゾール注射剤 500 mg，8時間ごと，7日間 メトロニダゾール注射剤 初回1,000 mg．その後，6時間ごとに500 mg
ジアルジア症	メトロニダゾール経口剤 750 mg/日，分3(小児では15-30 mg/kg/日)，5-7日間 チニダゾール経口剤 2 g(小児では50 mg/kg)，単回 アルベンダゾール 400 mg/日(22.5 mg/kg/日)，分1，5日間	ニタゾキサニド(Alinia) 1 g/日，分2(小児では200-400 mg/日)，3日間 パロモマイシン(Humatin) (研究班が保管するが，本疾患は対象外とされる)
クリプトスポリジウム症	アジスロマイシン(ジスロマック) 600 mg/日，分1，14日間 パロモマイシンと併用	ニタゾキサニド(Alinia) (研究班が保管し，免疫不全者のみ対象とする) 1 g/日，分2，14日間 (健常者では3日間で可) パロモマイシン(Humatin) (研究班が保管し，免疫不全者のみ対象とする) 1.5-2.25 g/日(25-35 mg/kg/day)，分3，14日間 アジスロマイシンと併用

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表3　肝外胆道寄生蠕虫症に対する治療

	保険適応のある寄生蠕虫症と用量	保険適応のない寄生蠕虫症と用量
パモ酸ピランテル (コンバントリン)	回虫症　10mg/kg，単回服用 鉤虫症　10mg/kg，単回服用	
メベンダゾール (メベンダゾール)		回虫症　200mg/日，分2，3日間 鉤虫症　200mg/日，分2，3日間 上記を1クールとし陰性化まで
イベルメクチン (ストロメクトール)	糞線虫症　200μg/kg/日，1日1回，朝食1時間前に服用．2週間後に再度同量を服用． 免疫不全状態や播種性糞線虫症では，陰性化するまで1-2週間隔で4回以上投与する．	
アルベンダゾール (エスカゾール)	エキノコックス症(包虫症) 600mg/日，分3，28日間服薬した後，14日間休薬のサイクルを繰り返す．	有鉤嚢虫症　15mg/kg/日 (最大800mg/日)，分2， 8-30日間
トリクラベンダゾール (Egaten)		肝蛭症　10mg/kg 1回服用　食直後 20mg/kg，分2　食直後(重症例)
プラジカンテル (ビルトリシド)	肝吸虫症　20-40mg/kg/日，分2，3日間 または　75mg/kg，分3，1日間	消化管寄生条虫症(成虫寄生の場合) 20mg/kgを1回服用後，下剤を併用 有鉤嚢虫症　50mg/kg/日，分3，30日間

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エキノコックス症（包虫症）
echinococcosis（hydatid disease）

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病態と診断

Ⓐ 病態

エキノコックス症（多包虫症，単包虫症）を引き起こす多包条虫，単包条虫の終宿主はキツネやイヌなどイヌ科動物で，ヒトは中間宿主に当たる．多包虫症は北半球で流行し，わが国では累計約600例，年間20例前後の報告をみるが，ほとんどすべて北海道に居住・旅行歴がある．本州で患者やイヌの成虫寄生が報告され，感染拡大が懸念される．

単包虫症は世界の牧畜地域で流行し，数年に1例の国内報告はすべて輸入症例である．終宿主の便に混じって排泄された虫卵が経口感染し，孵化した六鉤幼虫は，腸壁から血流やリンパ流を経て臓器に達する．

多包虫症の最好発臓器は肝臓（>97%）で，肝内の幼虫病巣は浸潤性に増大し，肺・脳・骨などへ転移することもある．潜伏期は10年以上と長いが，未治療のまま進行すると肝腫大，黄疸，腹水など癌と同様の症状が出現し，数年から十数年で死に至る．

Ⓑ 診断

多包虫症の臨床診断は，①北海道との関連，②画像診断（内部不均一な腫瘤性病変に石灰化），③血清診断による．遺伝子組換えEm18抗原を用いたイムノブロット法（旭川医科大学寄生虫学講座）は診断精度がほぼ100%で，疑診例には必須の血清診断である．病理学的検査，遺伝子検査により診断が確定する．

単包虫症の最好発臓器は肝臓（80%）で，大きな嚢胞性病巣を形成し，画像診断で「蜂の巣状」所見を呈するのが特徴的である．血清診断は，遺伝子組換えAntigen B抗原を用いたイムノブロット法が推奨される．上記抗原を用いた多包虫症，単包虫症迅速診断キット（製造，アドテック社 http://www.adtec-inc.co.jp）が正確で実地臨床での簡便性にも優れている．

治療方針

根治切除ができれば治癒するが，肝内多発や転移合併例では難しい．単包虫症では，胆管交通のない症例にPAIR（puncture, aspiration, injection, reaspiration）も推奨されている．エスカゾールによる化学療法が根治手術困難例に適用される．肝・肺の多包虫症には有効であるが，骨病変は難治との報告がある．本剤に幼虫殺滅効果はなく治癒判定も難しいため，長期継続が必要となる．

℞ 処方例

エスカゾール錠（200 mg）　3錠　分3　食事とともに服用　28日間連続服用し，14日間休薬を繰り返す

住血吸虫症
schistosomiasis

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病態と診断

Ⓐ 病態

住血吸虫は，世界的には感染者2億人とされる．中南米（マンソン住血吸虫），アフリカの大部分と中近東の一部（マンソン住血吸虫，ビルハルツ住血吸虫），中国・フィリピン・インドネシア（日本住血吸虫），ラオス・カンボジア（メコン住血吸虫）など，広範囲に分布するが，淡水性巻貝から幼虫（セルカリア）が経皮感染するので，流行国でも媒介貝生息地以外では感染の機会はない．1977年以降，国内での新感染例の報告はないが，海外旅行の増加・多様化や，海外の有病地からの入国者の増加により，輸入感染症として注意する必要がある．

門脈系血管に寄生した住血吸虫の産卵で，虫卵塞栓や結節が形成され，さまざまな病変を起こす．主に，下部泌尿生殖器（ビルハルツ住血吸虫）あるいは肝，消化管（そのほかの住血吸虫）が障害される．ビルハルツ住血吸虫では，膀胱での炎症継続が癌に発展する．ほかの住血吸虫症での慢性症状は，肝臓内の肉芽腫形成や線維化による門脈-大循環シャントによって起こる．

Ⓑ 診断

虫卵検査で陽性となれば確定診断に至るが，陰性でも，免疫血清検査を併せて行うのが望ましい．肝胆道系酵素や肝線維化マーカーは，個々の感染例で病態や治療効果を評価するうえで有用だが，特異性には乏しく，軽症例では異常を示さない．超音波検査などの画像検査では，住血吸虫症に特有な病変がみつかることもあり，日本住血吸虫症での網目状パターンといわれる肝線維化は特徴的である．

治療方針

プラジカンテル（ビルトリシド）は，住血吸虫症治療薬としてWHO基本薬剤リストに記載され，国内での保険適用はないが第1選択となる．

℞ 処方例

ビルトリシド錠（600 mg）　50-60 mg/kg　分2

保外

小児には安全とされるが，動物実験では高濃度投与で流産率が高まるなど，妊婦への安全性は確立されていない．

海外の流行地では40 mg/kgでの1回投与が治療の基本だが，その用量では駆虫できない例も，アフリカを中心に報告がある．プラジカンテルの成虫への作用はよく知られるが，成熟卵に対し生体内で孵化を促す働きもある．ELISA法などで虫卵抗原に対し高い抗体価を示す例は，糞便検査が陰性でも治療対象となると考えてよい．また，未熟卵の成熟を待ち，初回投与後2-3週間で同量を再投与する方法もある．国内の旧有病地で画像検査などで偶然みつかる例は，成虫は死滅し虫卵も石灰化しており，治療適応はないと考えられる．

その他の吸虫症（肺吸虫症，肝吸虫症，横川吸虫症，肝蛭症）

paragonimiasis, clonorchiasis/opisthorchiasis, metagonimiasis, fascioliasis

平山謙二　長崎大学教授・熱帯医学研究所免疫遺伝学

I 肺吸虫症

病態と診断

Ⓐ 病態

ウェステルマン肺吸虫と宮崎肺吸虫がヒトに感染する．いずれも人獣共通感染症である．終宿主である哺乳類から排出された虫卵は第1中間宿主の淡水産巻貝を経由し，第2中間宿主のサワガニやモクズガニなどの淡水産甲殻類の体内で感染型のメタセルカリアとなり，これを経口摂取すると感染する．イノシシはカニを好んで食べるが好適宿主ではないためメタセルカリアはそのまま筋肉内に留まっている．これを生食して感染することもある（ウェステルマン肺吸虫）．

Ⓑ 診断

感染から呼吸器症状出現（咳嗽，痰，血痰，胸痛）まで約1か月かかる．胸部画像所見としては胸水や気胸，肺実質の結節影（ウェステルマン肺吸虫症）がみられることがある．

他の肺疾患との鑑別には，好酸球増多症や病歴を参考に疑わしければ虫卵の検出や免疫血清診断を行う．

治療方針

いずれの肺吸虫にもプラジカンテル（ビルトリシド）が有効であるが，添付文書の記載よりも多めに投与する必要がある．

℞ 処方例

ビルトリシド錠　75 mg/kg　分3　3日間　保外
　用量

副作用はほとんどないが，妊娠3か月未満の妊婦には投与しない．

II 肝吸虫症

病態と診断

肝吸虫およびタイ肝吸虫がヒトの肝内胆管に寄生する．前者は東アジア，後者はインドシナのメコン流域に患者が多い．哺乳類の排出する虫卵は淡水産の巻貝を経てコイ科の淡水魚で感染型幼虫となり，生食により経口感染する．

少数寄生の場合無症状であるが，多数の場合胆管が閉塞し胆管炎，肝機能障害，肝硬変を引き起こすことがある．診断には糞便，胆汁中の虫卵検出を行う．

治療方針

プラジカンテルが有効である．

℞ 処方例

ビルトリシド錠　40 mg/kg　分2　2日間

III 横川吸虫症

病態と診断

感染型幼虫をもったアユ，シラウオなどの生食により感染し，1週間で成虫となり小腸粘膜に寄生する．普通無症状だが多数寄生すると下痢や腹痛を起こす．診断は糞便中の虫卵検査（集卵法）による．

治療方針

虫卵検査陽性であれば無症状でも薬物治療を行う．

℞ 処方例

ビルトリシド錠　40 mg/kg　分2　1日

IV 肝蛭症

病態と診断

ウシ，ヒツジ，ヤギなどの肝臓や胆管内に寄生する大型の吸虫（1×3 cmほど）だがヒトにも感染する．家畜の糞便中の虫卵は淡水産の巻貝でセルカリアとなり遊出して水草や牧草に付着し感染型幼虫となる．

ヒトではセリ，ミョウガなどにより経口感染し，急性胆嚢炎や胆石症と類似の症状（発熱，上腹痛）のほか著明な好酸球増多症を引き起こす．診断は糞便検査による虫卵の検出に免疫血清診断を併用する．

治療方針

ビルトリシドの駆虫効果は低いので，最近で

Chapter 11
Eastern Asia

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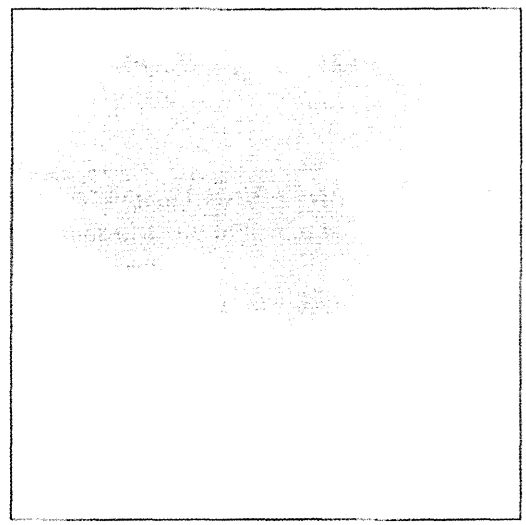

People's Republic of China
Mongolia
Republic of Korea (North)
Japan
Republic of Korea (South)
Taiwan

Eastern Asia consists of a large, highly diverse region with marked differences in climate, environment, population density, and cultures. Standards of hygiene as well as access to medical care and advanced diagnostics for infectious diseases may vary between and within countries, in particular, urban as compared to rural areas. Respiratory infections, hepatitis, and diarrheal diseases predominate in many regions; however, there is also a wide range of vector-borne diseases such as Japanese encephalitis, tick-borne encephalitis, dengue fever, and malaria. Added to this are the many diseases frequently associated with poverty including tuberculosis, sexually transmitted infections, and soil-, water-, and food-borne helminthiases. Emerging and reemerging infectious diseases remain a high risk in many areas; effective surveillance systems and infection control measures are inconsistent in some regions of Eastern Asia.

Acute infections within 4 weeks of exposure

The geography of infectious diseases in Eastern Asia is diverse due to significant variations in climate (subtropical, temperate, and subarctic) as well as marked differences in environment, population density, and cultures. Socioeconomic changes have led to significant improvements in health care in Japan, South Korea, Taiwan, and China's major cities. Rural China and Mongolia continue to experience inequity in access to health care and public health measures, thus impacting the type and incidence of infectious diseases that occur in these areas.

In general, communicable diseases in Japan, South Korea, Taiwan, and urban China have decreased with a trend toward noncommunicable and chronic diseases [1]. A GeoSentinel study of travelers to China from 1998 to 2007 found that the most common infectious diseases were respiratory in nature and that respiratory illness was the primary syndrome requiring hospitalization during travel [2]. Diarrheal diseases were also found to be common.

Japan's health-care infrastructure is well developed yet still faces potential threats from emerging infections such as avian influenza, human immunodeficiency virus (HIV), and tuberculosis. Dietary preferences for raw or undercooked fish and seafood can lead to food-borne helminthiases such as anisakiasis, diphyllobothriasis, angiostrongyliasis, spiruroid larva migrans, and paragonimiasis. Three rickettsial diseases are endemic—Japanese spotted fever, scrub typhus, and Q fever [3]. Japanese encephalitis (JE) is also endemic but has a very low prevalence following preventive measures including pediatric vaccinations. Malaria has been controlled since 1961.

South Korea's medical system has also significantly improved with less communicable diseases reported. There is risk, however, for food- and water-borne outbreaks due to changes in dietary habits and increasing levels of travel. A significant number of vaccine-preventable illnesses occur (in 2007 more than 20,000 cases of chicken pox; increased measles cases 592% year on year; and 118% increase in mumps) [4]. Since 1986 vivax malaria has reemerged in the demilitarized zone and is currently limited to rural areas in northern Kyonggi and Kangwon provinces.

Taiwan has a well-developed health-care system with effective surveillance systems. It was the first country globally to initiate a hepatitis B vaccination program followed by a hepatitis A program with subsequent reduction in hepatitis cases and hepatocellular carcinoma [5]. Due to its subtropical climate and location, outbreaks of dengue fever as were reported in September 2010 by Taiwan CDC may occur. Respiratory infections including influenza, diarrheal disease, food-borne helminthiases, and Japanese encephalitis also occur.

Data for infectious diseases in North Korea are limited; however, similar organisms endemic to South Korea and along the Chinese border are expected. Outbreaks of communicable diseases may be influenced by factors such as malnutrition and poverty. As with South Korea, vivax malaria reemerged in 1986 and is found in the southern part of the country and demilitarized zone.

Historically, Mongolia has a nomadic or seminomadic population with a close association with livestock. Recently, the rural population has been moving into the capital city Ulaanbaatar. Respiratory and diarrheal diseases are common as is brucellosis [6]. Sexually transmitted infections (40.3%), viral hepatitis (23.7%), and tuberculosis (9.6%) are the most commonly reported infections [7]. Other important but less common diseases are echinococcosis, plague, tularemia, anthrax, and rabies [7].

China is the world's most populous country with over 1.3 billion persons. Recent economic changes have led to inequity in health care and a large migrant population of 100 million persons. Migrants accounted for 3% of measles cases during the 2008 epidemic in all 31 provinces affecting 124,865 persons including 45 deaths [8].

Many different emerging disease threats exist for China including human [illegible]

infectious diseases such as viral hepatitis, typhoid fever, Japanese encephalitis, rabies, syphilis, neonatal tetanus, dengue fever, schistosomiasis, malaria, Crimean–Congo hemorrhagic fever, tick-borne encephalitis, clonorchiasis, and other food- and soil-borne helminthiases associated with poverty or lifestyle are found in different regions. China accounts for 90% of reported global hemorrhagic fever with renal syndrome cases [9] and 22% of the global burden of multidrug-resistant tuberculosis (MDR-TB) [10]. An outbreak of Chikungunya fever was reported in Dongguan city, Guangdong Province, in September 2010 with over 200 cases documented.

Vaccine-preventable infections such as hepatitis A and B, typhoid, rabies, measles, and influenza are common.

Japanese encephalitis is endemic and occurs in all areas except Qinghai province, Xinjiang, and Tibet. Major outbreaks occurred in 1966 (annual incidence >15/100,000) and in 1971 (174,932 cases and incidence of 20.92/100,000) [11]. A vaccination program has been in place since the 1980s; nonetheless, in 2008, there were 2,975 reported cases with 142 deaths in 25 provinces. High prevalence areas (JE incidence >1/100,000) include Shaanxi, Chongqing, Sichuan, Guizhou, Henan, and Yunnan. Although usually affecting mostly children under 15 years old, in the 2006 Yuncheng outbreak in Shanxi Province, 86% of patients were >30 years old with 28.8% fatality rate. Detection of Japanese encephalitis virus (JEV) genotype also changed from the more common genotype 3 to both genotypes 3 and 1 [11,12].

Malaria has decreased since the 1950s (30 million cases/year) to an annual incidence rate of 3.38/100,000 in 2008 (26,868 cases with 95% vivax) [13]. *Plasmodium falciparum* is only found in southern China in Yunnan and Hainan (considered an unstable malaria area along the Myanmar, Laos, and Vietnam borders with imported cases of drug-resistant falciparum malaria). *Plasmodium vivax* is the predominant species in China and is reemerging in central China where only vivax malaria is found.

The following tables outline many of the infectious diseases in Eastern Asia. It is important to keep in mind the changing nature of this region and the impact this may have on infectious disease patterns.

Central nervous system infections: encephalitis, meningitis, and other infections with neurological symptoms

Acute infections with less than 4 weeks of symptoms

Frequently found microorganisms	Less common microorganisms and diseases
Enteroviruses[a]	*Treponema pallidum*
Streptococcus pneumoniae	*Brucella* spp.[b]
Streptococcus agalactiae[c]	*Listeria monocytogenes*[d]
Haemophilus influenzae type b[e]	Rabies[f]
Neisseria meningitidis[g]	Influenza viruses
Japanese encephalitis virus[h]	Tick-borne encephalitis[i]
Herpes simplex I and II	*Angiostrongylus cantonensis*[j]
Mycobacterium tuberculosis	Cerebral malaria[k]

[a] Leading cause of aseptic meningitis. Outbreaks of acute encephalitis due to EV-71 in China and Taiwan.

[b] Highly endemic in Mongolia. Sporadic cases in South Korea and Japan.

[c] Most common type of [illegible]

[h]Highly endemic in China. Low annual incidence in Japan and South Korea but high reported prevalence of JEV-positive pigs. Not endemic in Mongolia.
[i]Northeast China, Japan (Hokkaido). First reported case in US traveler 2007 in Tianjin, China [15].
[j]Associated with ingestion of raw fish and snails in China, Taiwan, south Japan, and Korea. Outbreak in Beijing (2006).
[k]*P. falciparum* endemic in Yunnan and Hainan, China.

Central nervous system infections: meningitis and encephalitis with symptoms for more than 4 weeks and in the immunocompromised host

Microorganisms with symptoms for more than 4 weeks	Microorganisms in the immunocompromised host
HIV	*Nocardia*
M. tuberculosis	Polyomavirus
Cysticercus cellulosae	*Cryptococcus neoformans*
	JC virus
	Toxoplasma gondii

Ear, nose, and throat infections

Ear, nose, and throat infections with less than 4 weeks of symptoms

Frequently found microorganisms	Less common microorganisms and diseases
Enterovirus (rhinovirus, coxsackie virus, echovirus, EV-71)	Peritonsillar abscess
Adenovirus, coronavirus	Necrotizing fasciitis
Influenza A and B, parainfluenza	*M. tuberculosis*
Respiratory syncytial virus (RSV)	*Staphylococcus aureus*
Measles virus[a]	*Corynebacterium diphtheriae*
Rubella virus[b]	*Neisseria gonorrhoeae*
Epstein–Barr virus	*Chlamydia trachomatis*
Varicella zoster virus	*Legionella* spp.
H. influenzae type b[c]	Cytomegalovirus
Moraxella catarrhalis	HIV
Mycoplasma pneumoniae	
Chlamydophila	
Streptococcal spp.	
Herpes simplex I and II	

[a]Measles epidemics in Japan every 6–7 years since 1999 due to suboptimal vaccine coverage
[b]Rubella not included in all regions of China's national vaccination program with epidemics every 6–8 years.
[c]More common in China, Mongolia, North Korea, and Japan due to lack of vaccination against

Ear, nose, and throat infections with symptoms for more than 4 weeks and in the immunocompromised host

Microorganisms with symptoms for more than 4 weeks	Microorganisms in the immunocompromised host
M. tuberculosis	*Candida* spp.
Epstein–Barr virus	*Aspergillus* spp.
Cytomegalovirus	Herpes simplex I and II
	Cytomegalovirus
	Human herpes virus 8[a]

[a]Associated with Kaposi's sarcoma.

Cardiopulmonary infections

Pneumonia with symptoms for less than 4 weeks

Frequently found microorganisms	Less common microorganisms and diseases
S. pneumoniae	*Legionella* spp.
Klebsiella pneumoniae	*Burkholderia pseudomallei*[a]
H. influenzae	*S. aureus*
M. catarrhalis	*Orientia tsutsugamushi*[b] (scrub typhus)
S. aureus	*Leptospira interrogans*[c]
M. pneumoniae	*Paragonimus westermanii*[d]
Chlamydophila pneumoniae	*Gnathostoma spinigerum*[e]
Influenza virus, parainfluenza, RSV	*Bacillus anthracis* (anthrax)
	RSV
	M. tuberculosis
	Yersinia pestis (pneumonic plague)[f]
	Dengue hemorrhagic fever[g]
	Nontuberculous mycobacteria (*Mycobacterium kansasii*)[h]
	M. tuberculosis
	Salmonella spp.[i]
	Acinetobacter baumannii[a]
	SARS-corona virus
	Coxiella spp.[j]

[a]Southern China and Taiwan.

[b]Caused by bite of infected chigger mites in China, Korea, and Japan.

[c]Increased incidence in China; decreasing in Taiwan and Korea.

[d]Food-borne trematode, endemic in southern Japan, Korea, Taiwan, and central China.

[e]Japan, Korea, and China.

[f]Mongolia and China (Qinghai Province, Xinjiang, and Yunnan).

[g]Rare cases reported in south China [16].

[h]Korea.

[i]China.

Endocarditis with less than 4 weeks of symptoms

Frequently found microorganisms	Less common microorganisms
S. aureus	*N. gonorrhoeae*
Nonhemolytic streptococci	*Bartonella quintana*
Coagulase-negative staphylococci (*S. epidermidis*)	*Coxiella burnetii*
S. pneumoniae	*Brucella*
Enterococcus	*Propionibacterium acnes*
	Haemophilus species, *Actinobacillus actinomycetemcomitans*, *Cardiobacterium hominis*, *Eikenella corrodens*, and *Kingella* species (HACEK group)
	Pseudomonas aeruginosa
	Candida spp.

Pulmonary symptoms for more than 4 weeks and in the immunocompromised host

Microorganisms and diseases with symptoms for more than 4 weeks	Microorganisms and diseases in the immunocompromised host
S. pneumoniae	*Pneumocystis jirovecii*
M. catarrhalis (sinuses)	Cytomegalovirus
H. influenzae	Deep mycoses (*Candida*, *Cryptococcus*, Mucormycosis, *Aspergillus*, *Nocardia*, Actinomycosis)
S. aureus	*Histoplasma capsulatum*[a]
M. tuberculosis	*M. tuberculosis*
M. kansasii	Nontuberculous mycobacteria
Mycobacterium avium complex	*Rhodococcus equi*
P. aeruginosa	*P. aeruginosa*
Aspergillus spp.	*Nocardia* spp.
H. capsulatum[a]	
Cryptococcus spp.[b]	
Echinococcosis	

[a]Southeast China, Taiwan.

[b]71% of clinical strains in China (1985–2006) were from patients with no apparent risk factors [17]

Endocarditis for more than 4 weeks and in the immunocompromised host

The causative organisms can be any of those listed in the table for endocarditis with less than 4 weeks of symptoms. This may occur most commonly in cases of subacute endocarditis progressive symptoms may develop over weeks to months.

Gastrointestinal infections

Gastrointestinal infections with less than 4 weeks of symptoms

Frequently found microorganisms and diseases	Less common microorganisms and diseases

Frequently found microorganisms and diseases	Less common microorganisms and diseases
Enterotoxigenic *Escherichia coli* (ETEC)[a]	Cryptosporidia spp.
Shiga toxin-producing *E. coli* (STEC)	*Diphyllobothrium* spp.[b]
Shigella spp.[c]	*Anisakis*
Salmonella, nontyphi[d]	*M. tuberculosis*
Vibrio parahaemolyticus	*Streptococcus suis*[e]
Salmonella typhi and *S. paratyphi*[f]	*Vibrio cholerae*[g]
Campylobacter	*V. parahaemolyticus*[h]
Bacillus cereus toxin[i]	*Fasciolopsis* (giant intestinal fluke)[j]
S. aureus toxin	*Strongyloides stercoralis*
Ascaris lumbricoides	*Taenia saginata*
Enterobius vermicularis, other helminths	
Hookworm (*Ancylostoma duodenale*, *Necator americanus*)	
Taenia solium	

[a]Rare in Japan.

[b]Cestode acquired by ingesting raw or undercooked fish, more common in Japan.

[c]*Shigella flexneri* is a common bacterial pathogen in Mongolia.

[d]Common in Mongolia during summer months.

[e]Outbreak in Sichuan, China (2005) with 215 reported cases.

[f]More common in China; infrequent in Mongolia, Japan.

[g]Endemic in China, Korea. Outbreak in Selenge Province, Mongolia, 1996.

[h]Sporadic cases, common source outbreaks in Japan.

[i]Commonly associated with improperly stored cooked rice.

[j]China and Taiwan.

Gastrointestinal infections with symptoms for more than 4 weeks and in the immunocompromised host

Microorganisms with symptoms for more than 4 weeks	Microorganisms in the immunocompromised host
A. lumbricoides	*Candida* spp.
Trichuris trichiura	Herpes simplex I
Hookworm spp. (*N. americanus* and *A. duodenale*)[a]	*Cryptosporidium parvum* and *Cryptosporidium hominis*
Helicobacter pylori[b]	Cytomegalovirus
T. solium and *T. saginata*	*M. tuberculosis*
S. stercoralis	*Isospora belli*
M. tuberculosis	Microsporidia
Tropheryma whipplei (Whipple's disease)	*E. histolytica*
G. lamblia	*S. stercoralis*
Fasciolopsis (giant intestinal fluke)[c]	*Cyclospora cayetanensis*[d]

[a]39 million reported cases in China in 2006; associated with poverty and tropical/subtropical climates.

[b]Decreased prevalence with improved socioeconomic conditions, associated with gastric carcinoma and

Infections of liver, spleen, and peritoneum

Acute infections of liver and biliary tract with less than 4 weeks of symptoms

Frequently found microorganisms	Less common microorganisms and diseases
Hepatitis A	Hepatitis D
Hepatitis B[a]	Hepatitis E
Hepatitis C	Amebic liver abscess
Epstein–Barr virus	Dengue virus[b]
Cytomegalovirus	*Leptospira*
Clonorchis sinensis[c]	Herpes simplex virus
Brucella[d]	Crimean–Congo hemorrhagic fever[e]

[a]High incidence in China and Mongolia; decreasing in Taiwan, Korea with vaccination programs.
[b]Southern China.
[c]Estimated 30 million persons infected worldwide, mostly in China; more than 2 million cases in Korea from 1974 to 1982; decreasing in Japan; associated with cholangiocarcinoma.
[d]1,000–1,500 cases reported per year in Mongolia.
[e]Xinjiang, China.

Chronic infections of the liver and biliary tract

Frequently found microorganisms	Less common microorganisms and diseases
Chronic hepatitis B or C	*Brucella*
Schistosoma japonicum[a]	*C. burnetii* (Q fever)
C. sinensis	*Echinococcus* spp.[b]
Toxocara canis and *Toxocara cati*	

[a]Common in Yangtze River basin; decreased by 90% in past 50 years; still endemic in 110 counties (up to 1% prevalence) [18].
[b]China Mongolia, and northern Japan.

Infections of liver and biliary tract in immunocompromised host

Similar microorganisms can be found in both immunocompetent and immunocompromised individuals.

Genitourinary infections

Cystitis, pyelonephritis, and nephritis with less than 4 weeks of symptoms

Frequently found microorganisms	Less common microorganisms and diseases
E. coli	Hantavirus hemorrhagic fever with renal

Frequently found microorganisms	Less common microorganisms and diseases
K. pneumoniae *S. aureus* *P. aeruginosa*	*Enterococcus* spp. *Ureaplasma* *Mycoplasma* *M. tuberculosis* *L. interrogans* Adenovirus

[a]20,000–50,000 reported cases per year in China; 1,000 cases per year in South Korea; rare in Taiwan and Japan; not found in Mongolia.

Sexually transmitted infections with less than 4 weeks of symptoms

Frequently found microorganisms and diseases	Less common microorganisms
C. trachomatis *N. gonorrhoeae* Primary syphilis[a] *Mycoplasma* spp. Herpes simplex II Human papillomavirus *Trichomonas vaginalis* Molluscum contagiosum virus	*Haemophilus ducreyi* *Lymphogranuloma venereum* *E. histolytica* Pediculosis pubis

[a]Syphilis nearly eliminated in China (1950s); 10-fold increase in last decade with 278,215 reported cases and 9,480 reported cases congenital syphilis (2008). Most commonly reported communicable disease in Shanghai (2008) [19]; increasing in Mongolia (2008) [6].

Cystitis, pyelonephritis, and nephritis with symptoms for more than 4 weeks and in the immunocompromised host

Microorganisms with symptoms for more than 4 weeks	Microorganisms in the immunocompromised host
Proteus spp. *Enterobacter* spp. *P. aeruginosa* *Mycoplasma* spp. *M. tuberculosis*	*Candida* spp. *M. tuberculosis* *Corynebacterium* spp.

Sexually transmitted infections with symptoms for more than 4 weeks and in the immunocompromised host

Microorganisms with symptoms for more than 4 weeks	Microorganisms in the immunocompromised host
Human papillomavirus	Human papillomavirus
T. pallidum	Molluscum contagiosum virus
HIV[a]	HIV

[a]Low prevalence (820 HIV positive, 2009) in Mongolia but at increased risk due to changes in travel, lower age population, and increased sexually transmitted infections. Estimated 740,000 HIV positive in China (2009) with 70–80% in Yunnan, Guangxi, Henan, Sichuan, Xinjiang, and Guangdong; almost 9,000 HIV positive in Japan and 13,000 in South Korea 2008 (UNAIDS). Taiwan CDC reported 19,565 HIV cases from 1984 to September 2010. No report available for North Korea.

Joint, muscle, and soft tissue infections

Joint, muscle, and soft tissue infections with less than 4 weeks of symptoms

Frequently found microorganisms and diseases	Less common microorganisms and diseases
S. aureus	Cysticercosis[a]
S. pneumoniae	*Trichinella spiralis*
Streptococcus spp.	*N. gonorrhoeae*
Hepatitis B	*H. influenzae*
Parvovirus B19	Human sarcocystis
Rubella	*Salmonella* spp.
	Brucella
	Clostridium tetani[b]

[a]China and Mongolia.

[b]More common in rural China, mostly neonatal tetanus.

Joint, muscle, and soft tissue infections with more than 4 weeks of symptoms and in the immunocompromised host

Microorganisms and diseases with symptoms for more than 4 weeks	Microorganisms in the immunocompromised host
Borreliosis (Lyme disease)[a]	*Candida* spp.
M. tuberculosis	
Brucella	

[a]Endemic in Japan, China, Taiwan, and Mongolia.

Skin infections

Skin infections with less than 4 weeks of symptoms

Frequently found microorganisms	Less common microorganisms and diseases
S. aureus	Cutaneous bacillus anthracis
Group A streptococcus	*Borrelia* spp.
Tinea spp.	*Spirillum minus* and *Actinobacillus muris* (rat-bite fever)[a]
Scabies	Cutaneous leishmaniasis[b]
Herpes viruses	*Mycobacterium ulcerans*
Candida spp.	*O. tsutsugamushi* (scrub typhus)[c]
S. pneumoniae	*Sparganum mansoni* (sparganosis)[d]
	Cutaneous larva migrans[e]
	Rickettsia heilongjiangensis (Far Eastern spotted fever)[f]
	Rickettsia japonica (Japanese spotted fever)[g]
	Rickettsia siberica (North Asian tick typhus)[h]
	Rickettsia typhi (murine typhus)

[a]Japan.
[b]Uygur Autonomous Region Xinjiang, China.
[c]Seasonal autumn outbreaks in north China, Korea; summer in south China; summer and autumn in Japan.
[d]Associated with ingestion of raw fish in Japan.
[e]Southern China.
[f]Northeast China and rarely Japan.
[g]135 reported cases in Japan (2008).
[h]North China and Mongolia.

Skin infections with more than 4 weeks of symptoms and in the immunocompromised host

Microorganisms and diseases with symptoms for more than 4 weeks	Microorganisms and diseases in the immunocompromised host
T. pallidum	*Candida* spp.
M. tuberculosis	Human herpes virus 8 (Kaposi's sarcoma)
Human herpes virus 8 (Kaposi's sarcoma)	Nontuberculous mycobacteria
Mycobacterium leprae[a]	Deep fungal infections
Wuchereria bancrofti (lymphatic filariasis)[b]	*M. tuberculosis*

[a]Approximately 10 cases reported per year in Japan.
[b]Lymphatic filariasis has recently been eliminated in China; South Korea close to elimination [11]

Adenopathy

Adenopathy for less than 4 weeks

Frequently found microorganisms and diseases	Less common microorganisms and diseases
Epstein–Barr virus	*Francisella tularensis* (tularemia)
Cytomegalovirus	*B. quintana*
Parvovirus B19	*Ehrlichia*[a]
HIV	*Babesia*[b]
T. gondii	
Suppurative staphylococcal or streptococcal infections	

[a]China.
[b]Korea.

Adenopathy for more than 4 weeks and in the immunocompromised host

Microorganisms and diseases with symptoms for more than 4 weeks	Microorganisms and diseases in the immunocompromised host
T. gondii	Adenovirus
M. tuberculosis	Cytomegalovirus
HIV	Epstein–Barr virus
	HIV
	M. tuberculosis
	Nontuberculous mycobacteria
	Deep fungal infections

Fever without focal symptoms

Fever for less than 4 weeks without focal symptoms

Frequently found microorganisms and diseases	Less common microorganisms and diseases
Endocarditis	*Brucella*
Epstein–Barr virus	*M. tuberculosis*
Cytomegalovirus	Pyogenic abscess
T. gondii	*C. burnetii*
HIV	Dengue virus[a]
Parvovirus B19	*Plasmodium* spp.[b]
	F. tularensis
	Babesia
	Ehrlichia
	O. tsutsugamushi
	R. japonica[c]
	S. typhi and *S. paratyphi A*
	Bunya virus (Severe fever with

Fever for more than 4 weeks without focal symptoms and in the immunocompromised host

Microorganisms with symptoms for more than 4 weeks	Microorganisms in the immunocompromised host
T. gondii	Cytomegalovirus
M. tuberculosis	Epstein–Barr virus
HIV	*M. tuberculosis*

Eosinophilia and elevated IgE

Eosinophilia and elevated IgE for less than 4 weeks

Frequently found microorganisms	Less common microorganisms
A. lumbricoides and *A. suum*	*S. japonicum*
Hookworm spp. (*N. americanus* and *A. duodenale*)	*G. spinigerum*[a]
T. solium and *T. saginata*	*S. stercoralis*
Toxocara spp.	*A. cantonensis*
T. trichiura	*Anisakis*
C. sinensis	*Paragonimus* spp.

[a]Korea, Japan, and China.

Eosinophilia and elevated IgE for more than 4 weeks and in the immunocompromised host

All of the organisms listed in the table "Eosinophilia and elevated IgE for less than 4 weeks" except for *A. cantonensis* may cause an eosinophilia with elevated IgE for more than 4 weeks. All organisms listed could cause this in an immunocompromised host.

Antibiotic resistance

Antimicrobial resistance is increasing with some variability between and within countries. As most regions worldwide, Methicillin-resistant *Staphylococcus aureus* (MRSA) is a significant public health problem with 60–80% resistant strains and up to 90% resistance reported for hospital-acquired infections (HAIs) in China [21]. A study of resistance patterns in 1999 and 2001 in China found 23–77% mean prevalence of resistance among HAI and 15–39% for community-acquired infections. Average growth rate of resistance was 22% in one study from 1994 to 2000 [21].

In a study of nosocomial infections in Chinese intensive care units (2003 and 2007), *E. coli* was the most common cause of urinary tract infections as well as a frequent cause of lower respiratory tract infections with 92% resistance to trimethoprim sulfamethoxazole and 80%

China's burden of disease due to tuberculosis is high. The first nationwide drug resistance survey confirmed 5.7% MDR-TB for new cases and 25.6% for previously treated cases with total estimates of 100,000 MDR-TB cases annually [10].

In Mongolia, antimicrobial resistance is also common. Some potential factors include frequent, routine usage of antibiotics for 3 days postsurgery; drug susceptibilities often not available; and antibiotics available without prescription and used inappropriately. Studies in *N. gonorrhoeae* isolates have found 48–50% resistance to penicillin; 15% resistance to tetracycline; and 25% resistance to ciprofloxacin [6].

In South Korea, the resistance rate to erythromycin was reported as 2% in 1994 but increased to 41.3% in 1998 and 51% in 2002 in throat group A streptococci isolates [23]. The KONSAR 2001 study found increasing prevalence of vancomycin-resistant *Enterococcus faecium*, expanded-spectrum cephalosporin-resistant *K. pneumoniae*, and imipenin-resistant *P. aeruginosa* [24].

Vaccine-preventable diseases in children

All countries in East Asia have pediatric vaccination programs; however, few programs include a vaccine against *H. influenzae* type b (unavailable in China, Japan, South Korea, or North Korea programs but available in Mongolia). Vaccines against *S. pneumoniae* are also generally unavailable. Japanese encephalitis vaccine is an important part of childhood immunizations in China, Japan, Taiwan, and South Korea and has greatly impacted on the incidence rate of this potentially fatal disease. Many Eastern Asian countries are hyperendemic for hepatitis B with the majority of transmission at birth. The hepatitis B vaccine series is included in the pediatric vaccination schedules in China, South Korea, North Korea, Taiwan, and Mongolia. Taiwan was the first country worldwide to offer routine hepatitis B vaccinations followed by the addition of hepatitis A vaccinations with a significant reduction in hepatitis B cases.

Varicella, human papillomavirus, influenza, and meningococcal vaccines also vary between country programs but are generally not included except for meningococcal A or meningococcal A and C in China and meningococcal ACWY in Mongolia. All countries give a dose of BCG following birth to reduce the risk of meningeal or miliary tuberculosis and all give at least one measles dose. Mumps vaccine is not offered in North Korea.

Despite the availability of these programs, there can be inconsistent uptake of vaccines in some populations (such as the "floating" or migrant population in China) leading to significant outbreaks of vaccine-preventable illnesses. Outbreaks of measles (2005 China; 2000, 2001, and 2007 Japan; 2007 South Korea) and mumps (2007 South Korea) have been recorded regularly. In addition, major outbreaks of influenza occur seasonally.

The World Health Organization has targeted 2012 for measles elimination in Eastern Asia. In order to accomplish this and also to decrease the burden of disease caused by vaccine-preventable illnesses, there is a significant need for strengthening of infectious disease surveillance and better access to pediatric immunizations within many parts of this region.

Basic economic and demographic data

	GNI per capita (USD)	Life expectancy at birth (total, years)	School enrollment primary (% net)

	GNI per capita (USD)	Life expectancy at birth (total, years)	School enrollment, primary (% net)
Korea (North)	NA	67	NA
Korea (South)	21,530	79	98
Mongolia	1,680	67	89
Taiwan	NA	NA	NA

World Bank.

GNI, gross national income; NA, not available.

Causes of death in children under 5 years—regional average

	%
Neonatal causes	47
Pneumonia	14
Diarrheal diseases	12
Malaria	0
HIV/AIDS	0
Measles	1
Injuries	7
Others	18

WHO, 2000–2003 data.

Most common causes of death in all ages in Mongolia, China, and Japan

	%		
	Mongolia	China	Japan
Cerebrovascular diseases	13	18	14
Chronic obstructive lung diseases	NS	14	NS
Tuberculosis	5	3	NS
Lower respiratory infections	4	3	9
Diarrheal diseases	4	NS	NS
Perinatal conditions	5	3	NS
Ischemic and hypertensive heart diseases	9	8	10
Road traffic accidents	6	NS	NS
Self-inflicted injuries	NS	3	3
All cancers	12	13	21
Urogenital diseases	NS	NS	2