

肺炎のリスク因子・予防因子に関する系統的レビュー

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研究要旨

肺炎に関連する因子のうち、病原体やワクチン接種以外の因子として生活習慣・生活環境や基礎疾患などに着目し、系統的レビューによりこれまでの知見をまとめた。2,269編の候補論文から76編を採択し、「肺炎の罹患」「肺炎による入院」「肺炎による死亡」の各結果指標について、年齢層（小児・青少年、成人、高齢者）別にリスク因子・予防因子を整理した。

1. 肺炎の罹患に関連する因子

年齢にかかわらずリスク因子として報告されているものは、社会経済学的状況が低い、低体重、喫煙（小児では受動喫煙）、呼吸器疾患の既往、ステロイド投与、胃酸抑制剤の投与（H2阻害薬、成人・高齢者ではプロトンポンプ阻害薬）、であった。

小児・青少年では、在胎週数が短い、兄弟姉妹数・家族数が多い、デイケアに通園、などが特徴的なリスク因子であった。また、母乳栄養は予防因子として報告されていた。

成人では、多量飲酒、呼吸器・心血管疾患をはじめとする各種疾病の既往・併存、低栄養を反映していると考えられる検査値などがリスク因子であった。食習慣のうち、脂肪酸摂取はリスク因子、リノレン酸摂取は予防因子として報告されていた。高度肥満は予防因子であった。

高齢者では、成人で報告されているリスク因子に加え、高齢、日常生活自立度が低いことがリスク因子として報告されていた。ACE阻害薬内服は予防因子であった。

2. 肺炎による入院に関連する因子

いずれの年齢層についても、肺炎罹患を結果指標とした場合の関連因子とほぼ同様の結果が報告されていた。成人・高齢者では、6歳未満児との同居がリスク因子であった。

3. 肺炎による死亡に関連する因子

小児・青少年および成人では、低体重がリスク因子であった。成人・高齢者では、喫煙、心疾患・糖尿病・腎障害などの疾患の既往・併存がリスク因子、スタチン投与が予防因子として報告されていた。

本検討結果は、肺炎のハイリスク者を特定し、効果的な予防対策に繋げるための基礎資料になり得る。また、本検討で特定した関連因子は、今後、肺炎に関する疫学研究の実施にあたり、交絡因子として考慮すべきと考えられた。

A. 研究目的

肺炎はわが国における死因の第4位を占めており、特に高齢者における死亡率が高い。小児についてみると、肺炎による死亡は近年では極めて稀であるも

の、肺炎の罹患・入院による疾病負担は現在も公衆衛生上の課題である。

感染症制御のための主たる対策は、三大要素である「感染源（病原体）、感染経路、感受性宿主」のい

ずれかに対して行うものである。肺炎についても、その病原体を明らかにすること、感受性宿主の免疫を高めることを目的としたワクチン接種の効果を明らかにすることは最重要課題である。一方で、病原体やワクチン接種以外の因子で、肺炎と関連する生活習慣・生活環境や基礎疾患などを明らかにすることにより、肺炎のハイリスク者を特定し、効果的な予防対策に繋げることも有用である。

今回、肺炎に関連する因子のうち、病原体やワクチン接種以外の因子について知見をまとめるため、系統的レビューを行った。

B. 研究方法

1. 論文検索

PubMedを使用し、平成21年8月18日に検索を実施した。キーワードは「(pneumonia) AND (epidemiology OR risk OR vaccine efficacy OR vaccine effectiveness) AND (cohort OR case-control)」とし、「English or Japanese」「Human」で制限した。「vaccine efficacy」「vaccine effectiveness」の各キーワードを含めた理由は、ワクチン有効性を検討した論文で、ワクチン接種以外の因子を交絡因子として検討し、結果を記載している論文もレビュー対象とするためである。Abstractのないものを除外した結果、2,269編の論文が該当した。

2. 抄録レビューおよび文献レビュー

2,269編の論文について抄録レビューおよび文献レビューを行い、以下の基準に該当する論文を除外した。

- ・論文形態：総説、letter
- ・研究デザイン：無作為化比較試験、記述疫学
- ・経済分析
- ・対象者：基礎疾患を有する者に限定(慢性閉塞性肺疾患、糖尿病など)
- ・曝露要因：遺伝子多型、特殊なバイオマーカー(サイトカインなど、健診レベルで測定されないもの)
- ・結果指標：院内肺炎(含：ventilator-associated pneumonia、術後肺炎)、誤嚥性肺炎
- ・肺炎患者を対象に、入院・死亡等のリスクを検討採択した76編の論文について、報告された関連のうち統計学的に有意なものを抽出した。その後、「肺炎の罹患」「肺炎による入院」「肺炎による死亡」の各結果指標について、年齢層(小児・青少年、成人、高齢者)別にリスク因子・予防因子をまとめた。

C. 研究結果

文献レビューの結果を、表1(結果指標：肺炎の罹患)、表2(結果指標：肺炎による入院)、表3(結果指標：肺炎による死亡)に示す。

以下、肺炎のリスク因子・予防因子を年齢層(小児・青少年、成人、高齢者)別に列挙する。

1. 肺炎の罹患に関連する因子(表1)

(1) 小児・青少年(18歳未満)

①リスク因子

- ・性、年齢、人種：若年小児
- ・社会経済学的状況：報告なし
- ・出生時：在胎週数が30週未満、低体重、低身長
- ・体格、栄養状態：報告なし
- ・生活環境：母乳育児の期間が短い、兄弟姉妹数が多い、家族数が多い、デイケアに通園、薪ストーブの使用、家庭内喫煙者あり
- ・既往歴・併存疾患：喘鳴・喘息、アレルギー性鼻炎、肺炎、麻疹(過去6週間)、下痢(過去1ヵ月間)、貧血、繰り返す呼吸器感染症、鼓室穿刺術(2歳まで)
- ・治療薬：胃酸抑制剤

②予防因子

- ・性、年齢、人種：報告なし
- ・社会経済学的状況：母親あるいは父親の就学年数が長い
- ・出生時：体重が3,500g以上、夏季に出生
- ・体格、栄養状態：報告なし
- ・生活環境：母乳栄養
- ・既往歴・併存疾患：報告なし
- ・治療薬：報告なし

(2) 成人(18歳～64歳)

①リスク因子

- ・性、年齢、人種：報告なし
- ・社会経済学的状況：低収入
- ・体格、栄養状態：低体重
- ・生活習慣：喫煙、多量飲酒、脂肪酸摂取
- ・生活環境：職業曝露(metal fume)
- ・既往歴・併存疾患：呼吸器疾患(慢性閉塞性肺疾患、喘鳴・喘息、慢性気管支炎)心血管疾患(うっ血性心不全、虚血性心疾患、脳卒中)、糖尿病、逆流性食道炎、裂孔ヘルニア、深部静脈血栓症、肺塞栓症、関節リウマチ、肝疾患、精神疾患(うつ、双極性障害、アルコール依存症)、てんかん、う歯、

外来受診回数

- ・検査値：低コレステロール、低アルブミン値、低蛋白、クレアチニン高値、血沈が高い
- ・治療薬：ステロイド、胃酸抑制剤、プロトンポンプ阻害薬、利尿剤、カルシウムチャネル遮断薬、硝酸剤、アミノフィリン製剤

②予防因子

- ・性、年齢、人種：報告なし
- ・社会経済学的状況：報告なし
- ・体格、栄養状態：高度肥満 (BMI \geq 30)
- ・生活習慣：リノレイン酸の摂取
- ・生活環境：報告なし
- ・既往歴・併存疾患：報告なし
- ・検査値：報告なし
- ・治療薬：報告なし

(3) 高齢者 (65歳以上)

①リスク因子

- ・性、年齢、人種：男性、高齢
- ・社会経済学的状況：報告なし
- ・体格、栄養状態：低体重、低栄養
- ・生活習慣：喫煙、多量飲酒、脂肪酸摂取が多い、不適切な口腔ケア
- ・生活環境：加湿器の使用、空気浄化フィルターの使用、ガス・煙・化学物質・粉塵への職業上の曝露
- ・日常生活の自立度：車いす使用、寝たきり状態、入浴・着替え・食事・排泄・移動に介助が必要
- ・既往歴・併存疾患：外来受診回数が多い、呼吸器疾患(肺炎、慢性閉塞性肺疾患、喘息、在宅酸素療法の適応)、心血管疾患(うっ血性心不全、虚血性心疾患、脳卒中)、糖尿病、慢性肝疾患、逆流性食道炎、裂孔ヘルニア、深部静脈血栓症、肺塞栓症、関節リウマチ、貧血、悪性腫瘍、腎疾患、嚥下障害・誤嚥、パーキンソン病、認知障害、精神疾患(統合失調症、うつ、不安神経症、双極性障害、不眠症、せんもう、アルコール依存症)、てんかん、視力障害、ヘルペス
- ・検査値：報告なし
- ・治療薬：ステロイド、気管支拡張剤、降圧剤、胃酸抑制剤(H₂阻害薬、プロトンポンプ阻害薬)、スタチン、免疫抑制剤、サプリメント剤(亜鉛)、パーキンソン病治療薬、ベンゾジアゼピン、向精神薬、抗鬱薬、安定剤、ヒスタミンH₂受容体拮抗薬、抗生剤の使用(過去1ヵ月)

②予防因子

- ・性、年齢、人種：報告なし
- ・社会経済学的状況：報告なし
- ・体格、栄養状態：高度肥満 (BMI \geq 30)
- ・生活習慣：リノレイン酸の摂取
- ・生活環境：暖炉の使用
- ・日常生活の自立度：報告なし
- ・既往歴・併存疾患：リウマチ性疾患、心疾患、肺炎(過去1年間)
- ・検査値：報告なし
- ・治療薬：ACE阻害薬、サプリメント剤(マルチビタミン)

2. 肺炎による入院に関連する因子(表2)

(1) 小児・青少年(18歳未満)

①リスク因子

- ・性、年齢、人種：男性、若年小児
- ・社会経済学的状況：父親・母親の就学年数が短い
- ・出生時：早期産、低体重
- ・体格、栄養状態：低栄養、ビタミンA不足症
- ・生活環境：兄弟姉妹あり、家庭内に喫煙者あり、母乳育児の期間が短い、寝室で調理をしている、デイケアに通園している、家族数が多い、離乳食開始時期が月齢3ヵ月未満、DPTワクチン未接種
- ・既往歴・併存疾患：呼吸器疾患による入院
- ・治療薬：報告なし

②予防因子

- ・性、年齢、人種：年長児
- ・社会経済学的状況：報告なし
- ・出生時：報告なし
- ・体格、栄養状態：報告なし
- ・生活環境：家族内で寝室を共有する人数が少ない、急性呼吸器疾患の家族歴
- ・既往歴・併存疾患：報告なし
- ・治療薬：報告なし

(2) 成人(18~64歳)

①リスク因子

- ・性、年齢、人種：男性、高齢
- ・社会経済学的状況：就学年数が短い
- ・体格、栄養状態：BMI低値
- ・生活習慣：喫煙
- ・生活環境：未婚、職業なし、職業上の粉塵曝露、6歳未満児と同居

- ・既往歴・併存疾患：呼吸器疾患(慢性閉塞性肺疾患、喘息、結核、頻繁のかぜ罹患、小児期の肺炎罹患)、心血管疾患、糖尿病
- ・検査値：報告なし
- ・治療薬：強心剤、ステロイド、気管支拡張剤

②予防因子

- ・性、年齢、人種：報告なし
- ・社会経済学的状況：報告なし
- ・体格、栄養状態：報告なし
- ・生活習慣：報告なし
- ・生活環境：子供との接触、家庭内最年少児への肺炎球菌ワクチン接種
- ・既往歴・併存疾患：報告なし
- ・検査値：報告なし
- ・治療薬：報告なし

(3) 高齢者(65歳以上)

①リスク因子

- ・性、年齢、人種：男性、高齢、白人
- ・社会経済学的状況：メディケイド(医療扶助)受給者、就学年数が短い
- ・体格、栄養状態：BMI低値、低栄養
- ・生活習慣：喫煙、多量飲酒
- ・生活環境：未婚、職業なし、職業上の粉塵曝露、6歳未満児と同居、セントラルヒーティングがない
- ・日常生活の自立度：自立度が低い
- ・既往歴・併存疾患：呼吸器疾患(慢性閉塞性肺疾患、喘息、結核、頻繁のかぜ罹患、小児期の肺炎罹患、肺炎、在宅酸素療法の適応)、心血管疾患(虚血性心疾患、心筋梗塞、狭心症、うっ血性心不全、脳卒中)、糖尿病、腎疾患(腎不全)、悪性腫瘍、免疫抑制状態、認知症、せんもう、誤嚥・嚥下障害、関節炎、大腿骨骨折、敗血症、カンジダ症、外来受診回数が多い、前年度の入院あり
- ・検査値：報告なし
- ・治療薬：ステロイド、気管支拡張剤、ジギタリス、ACE阻害薬、カルシウムチャネル遮断薬、利尿剤、ヒスタミンH2受容体拮抗薬、プロトンポンプ阻害薬、吸入薬(抗コリン薬、 β 作動薬、ステロイド)

②予防因子

- ・性、年齢、人種：女性
- ・社会経済学的状況：報告なし
- ・体格、栄養状態：報告なし
- ・生活習慣：喫煙

- ・生活環境：子供との接触、家庭内最年少児に対する肺炎球菌ワクチン接種
- ・日常生活の自立度：報告なし
- ・既往歴・併存疾患：肺炎(過去1年)、下肢静脈瘤
- ・検査値：報告なし
- ・治療薬：抗生剤

3. 肺炎による死亡に関連する因子(表3)

(1) 小児・青少年(18歳未満)

①リスク因子

- ・性、年齢、人種：報告なし
- ・社会経済学的状況：報告なし
- ・出生時：報告なし
- ・体格、栄養状態：低体重
- ・生活環境：報告なし
- ・既往歴・併存疾患：セリアック病
- ・治療薬：報告なし

②予防因子：報告なし

(2) 成人(18~64歳)

①リスク因子

- ・性、年齢、人種：報告なし
- ・社会経済学的状況：報告なし
- ・体格、栄養状態：低体重
- ・生活習慣：喫煙、運動習慣がない、歩行習慣がない
- ・生活環境：報告なし
- ・既往歴・併存疾患：心筋梗塞、糖尿病、結核、悪性腫瘍、血液透析
- ・検査値：eGFR(推算糸球体濾過率)の低下
- ・治療薬：報告なし

②予防因子

- ・性、年齢、人種：報告なし
- ・社会経済学的状況：報告なし
- ・体格、栄養状態：報告なし
- ・生活習慣：報告なし
- ・生活環境：報告なし
- ・既往歴・併存疾患：報告なし
- ・検査値：報告なし
- ・治療薬：スタチン投与

(3) 高齢者(65歳以上)

①リスク因子

- ・性、年齢、人種：高齢
- ・社会経済学的状況：報告なし

- ・ 体格、栄養状態：報告なし
- ・ 生活習慣：喫煙
- ・ 生活環境：報告なし
- ・ 日常生活の自立度：障害あり
- ・ 既往歴：併存疾患：糖尿病、うっ血性心不全、認知障害、うつ、パーキンソン病
- ・ 検査値：eGFR(推算糸球体濾過率)の低下
- ・ 治療薬：報告なし

②予防因子

- ・ 性、年齢、人種：報告なし
- ・ 社会経済学的状況：報告なし
- ・ 体格、栄養状態：BMI高値
- ・ 生活習慣：報告なし
- ・ 生活環境：報告なし
- ・ 日常生活の自立度：報告なし
- ・ 既往歴・併存疾患：報告なし
- ・ 検査値：報告なし
- ・ 治療薬：スタチン投与

D. 考察

1. 肺炎の罹患に関連する因子

年齢にかかわらずリスク因子として報告されているものは、社会経済学的状況が低い、低体重、喫煙(小児では受動喫煙)、呼吸器疾患の既往、ステロイド投与、胃酸抑制剤の投与(H2阻害薬、成人・高齢者ではプロトンポンプ阻害薬)、であった。

小児・青少年(18歳未満)では、在胎週数が短い、兄弟姉妹数・家族数が多い、デイケアに通園、などが特徴的なリスク因子であった。また、母乳栄養は予防因子として報告されていた。

成人(18~64歳)では、多量飲酒、呼吸器・心血管疾患をはじめとする各種疾患の既往・併存、低栄養を反映していると考えられる検査値などがリスク因子であった。脂肪酸摂取はリスク因子、リノレイン酸摂取は予防因子として報告されていた。高度肥満は予防因子であった。

高齢者(65歳以上)では、成人で報告されているリスク因子に加え、高齢、日常生活自立度が低いことがリスク因子として報告されていた。ACE阻害薬内服は予防因子であった。

2. 肺炎による入院に関連する因子

いずれの年齢層についても、肺炎罹患を結果指標とした場合の関連因子とほぼ同様の結果が報告され

ていた。成人・高齢者(18歳以上)では、6歳未満児との同居がリスク因子であった。

3. 肺炎による死亡に関連する因子

小児・青少年および成人(64歳未満)では、低体重がリスク因子であった。

成人・高齢者(18歳以上)では、喫煙、心疾患・糖尿病・腎障害などの疾患の既往・併存がリスク因子であり、スタチン投与が予防因子として報告されていた。

E. 結論

肺炎に関連する因子のうち、病原体やワクチン接種以外の因子として生活習慣・生活環境や基礎疾患などに着目し、系統的レビューによりこれまでの知見をまとめた。2,269編の候補論文から76編を採択し、「肺炎の罹患」「肺炎による入院」「肺炎による死亡」の各結果指標について、年齢層(小児・青少年、成人、高齢者)別にリスク因子・予防因子を整理した。

本検討結果は、肺炎のハイリスク者を特定し、効果的な予防対策に繋げるための基礎資料になり得る。また、本検討で特定した関連因子は、今後、肺炎に関する疫学研究の実施にあたり、交絡因子として考慮すべきと考えられた。

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F. 健康危険情報

なし

G. 研究発表

1. 論文発表
なし
2. 学会発表
なし

H. 知的財産権の出願・登録状況

1. 特許取得
なし
2. 実用新案登録
なし
3. その他
なし

表 1. 肺炎の罹患に関連する因子

Ref. No.	First author/Year/Country	Study Design/Year/Follow-up period	Subjects (M: male, F: female)	Mean (or median) age (M: male, F: female)	Risk factor		Preventive factor	
					Variables	Association	Variables	Association
1	Wright AL / 1998/US	Prospective birth cohort study/ 1991-1992 (before program) 1993-1994 (during program) / 1 year	977 infants before program and 858 infants during program	Neonates			breastfeeding promotion program	The proportion of women breastfeeding exclusively increased from 16.4% to 54.6% after the intervention. The percent of children having pneumonia declined 32.2% (P=0.04).
2	Hasan K / 2006/US	Prospective birth cohort study/ 1993-1994/ 24 months	252 neonates	Neonates	Number of family in household: >1 (ref: 1) Presence of school aged children in household	OR=3.67 (1.05-12.8) OR=3.21 (0.95-10.8)		
3	Fonseca W/ 1996/Brazil	Case-control study/ 1989-1990	650 pairs	0-23 months	Weight for height z score: <-3 Number of episode of wheezing: >2 Birth weight: <2000g Number of children at home: >6 Non-breastfeeding	OR=6.75 (1.88-24.27) OR=3.91 (1.29-11.92) OR=3.16 (1.12-8.94) OR=2.36 (1.26-4.43) OR=1.69 (1.02-2.80)		
4	Morris K / 1990/US	Case-control study/ 1988	58 cases 58 controls	2-24 months	Wood-burning stove Respiratory illness exposure	OR=4.85 (1.69-12.9) OR=1.44 (1.58-11.3)		
5	Khan AJ/ 2009/US	Cohort study/ 2001-2002/ >14 months	5,204 children	2-35 months	Altitude: 1980-2285 m (ref: <1980 m) Altitude: 2288-2590 m (ref: <1980 m)	IRR=1.66 (1.45-1.90) IRR=1.09 (0.92-1.30)	Altitude: >2590m (ref: <1980 m)	IRR=0.16 (0.08-0.3)
6	Heiskanen-Kosma T/ 1997/ Finland	Population-based case-control study/ 1981-1982	176 cases (M:100, F:76) 233 controls (M:110, F:123)	3 months-15 years	Recurrent respiratory infections (strata: <5 years of age) Recurrent respiratory infections (strata: ≥5 years of age) History of wheezing episodes (strata: <5 years of age) History of wheezing episodes (strata: ≥5 years of age) History of tympanocentesis at <2 years of age (strata: <5 years of age)	OR=5.5 (2.0-14.2) OR=3.0 (1.1-7.9) OR=5.3 (2.3-12.2) OR=2.1 (1.0-4.3) OR=3.6 (1.5-8.9)		
7	Canani RB/ 2006/Italy	Prospective cohort study/ 2003-2004/ 4 months	91 gastric acidity-inhibitor users (M:48, F:43) 95 controls (M:50, F:45)	4-36 months	Gastric acidity-inhibitor	OR=6.39 (1.38-29.7)		
8	Akramuzzaman SM/ 2000/Bangladesh	Cohort study/ 1995-1996/24 weeks	<Hospital cohorts> 117 with measles in the last 6 weeks 117 without measles <Community cohorts> 137 with measles in the last 6 weeks 137 without measles	6-143 months	<Community cohorts> Measles in the last 6 weeks	RR=3.1 (1.0-9.8)		
9	Ritzwoller DP/ 2005/US	Retrospective cohort study/ 2003/1 month	29,726 children (M:15,100, F:14,626)	6 months-8 years	Age: 6-11 months (ref: 7-8 years) Age: 12-23 months (ref: 7-8 years) Age: 2-4 years (ref: 7-8 years) Age: 5-6 years (ref: 7-8 years) Asthma Allergic rhinitis	HR=3.97 (2.86-5.50) HR=4.27 (3.25-5.61) HR=3.43 (2.70-4.35) HR=1.51 (1.14-1.99) HR=1.44 (1.12-1.85) HR=3.20 (1.83-5.60)		

(続々)

表 1. 肺炎の罹患に関連する因子 (続き)

Ref. No.	First author/Year/Country	Study Design/Year/Follow-up period	Subjects (M: male, F: female)	Mean (or median) age (M: male, F: female)	Risk factor		Preventive factor	Association
					Variables	Variables		
10	Louhiala PJ/ 1995/Finland	Retrospective cohort study/1984-1989/12 months	2568 children	1-7 years	Day care center (strata: 1 year of age) Day care center (strata: 3 year of age)	RR=6.69 (2.31-40.55) RR=10.01(1.13-88.86)		
11	Coles CL/ 2005/Israel	Case-control study/2001-2002	334 cases (M:192) 529 controls (M:294)	Case: 21 months Control: 15 months	Anemia Low birth weight Height for age z score: ≤-2 Serum retinol concentration (per 1ug/dl increment) Number of diarrhea episodes within 31 days prior to enrollment: ≥1	OR=3.32 (2.24-4.94) OR=2.16 (1.32-3.54) OR=2.22 (1.31-3.78) OR=1.03 (1.02-1.05) OR=2.30 (1.26-4.19)		
12	Simoes EA/ 1993/US	Retrospective cohort study/1983-1989/2 years	68 children (M:42, F:26)	<24 months	Gestational age: <30 weeks >1 person/19m ² living area >1 child/22m ² living area	OR=8.1 (1.1-61.4) OR=14.4 (1.9-109.6) OR=8.4 (2.4-29.8)		
13	Victoria CG/ 1994/ Brazil	Hospital-based case-control study/ 1990	510 cases (M:311, F:199) 510 controls (M:247, F:263)	<24 months	Male Number of family: ≥6 (ref: 2-3) Number of children in household: ≥3 (ref: none) Day care attendance Length for age z score: ≤-2 (ref: >-1) Weight for age z score: ≤-2 (ref: >-1) Weight for length z score: ≤-2 (ref: >-1) Formula milk (ref: breastfeeding) Cow milk (ref: breastfeeding) Milk supplements History of pneumonia treated at home History of pneumonia hospitalized History of wheezing treated at home History of wheezing hospitalized	OR=1.74 (1.34-2.27) OR=1.49 (1.06-2.10) OR=1.50 (1.02-2.21) OR=9.30 (4.26-20.3) OR=2.04 (1.41-2.95) OR=5.87 (3.30-10.4) OR=2.46 (1.07-5.67) OR=3.20 (1.72-5.98) OR=3.10 (1.91-5.01) OR=2.29 (1.21-4.33) OR=2.71 (1.65-4.45) OR=3.71 (2.37-5.79) OR=1.68 (1.20-2.35) OR=4.61 (1.66-8.00)	Month of birth: Jul-Sep (ref: Jan-Mar) Maternal education: ≥8 years (ref: <2 years) Paternal education: ≥8 years (ref: absent) Birth weight: ≥3500g (ref: <2500g)	OR=0.45 (0.24-0.85) OR=0.60 (0.38-0.94) OR=0.53 (0.34-0.83) OR=0.61 (0.39-0.95)
14	Gessner BD/1995/US	Population-based case-control study /1983-1995	29 cases 85 controls	<2 years	Child care attendance Presence of at least one tobacco chawer in household	OR=98.6 (5.1-1920.6) OR=20.6 (1.4-294.5)		
15	Almirall J/1999/Spain	Population-based case-control study /1993-1995	205 cases 475 controls	15-75 years	Ever smokers (ref: never smokers) Current smokers (ref: never smokers) Ex-smokers (ref: never smokers) Pack-years of smoking: 5-16.4 (ref: never smokers) Pack-years of smoking: 16.4-38 (ref: never smokers) Pack-years of smoking: >38 (ref: never smokers)	OR=2.0 (1.24-3.24) OR=1.88 (1.11-3.19) OR=2.14 (1.26-3.65) OR=2.06 (1.10-3.85) OR=2.83 (1.45-5.48) OR=3.15 (1.52-6.51)		
16	Farr BM/ 2000/US	Hospital-based case-control study/ 1984-1985	66 cases (M:36, F:30) 489 controls (M:220, F:269)	15-79 years	CGPD Congestive heart failure Former smokers (ref: never smokers)	OR=2.52 (1.42-4.46) OR=10.9 (3.56-34.1) OR=1.99 (1.14-3.47)		

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表 1. 肺炎の罹患に関連する因子 (続き)

Ref. No.	First author/Year/Country	Study Design/Year/Follow-up period	Subjects (M: male, F: female)	Mean (or median) age (M: male, F: female)	Risk factor		Preventive factor	Association
					Variables	Association		
17	Klement E/ 2006/Israel	Cohort study/2004/12 days (outbreak investigation)	91 male soldiers	18-21 years	Smoking Absence of specific IgG	OR=5.6 (1.5-20.4) OR=7.8 (1.4-42.5)		
18	Pereira JC/ 1997/ Brazil	Case-control study/ 1994	51 cases (M:24, F:27) 51 non-respiratory controls (M:24, F:27) 51 healthy controls (M:24, F:27)	Case: M18.1/F27.1 Non respiratory control: M18.4/F28.9 Healthy control: M18.0/F27.6	Wheezing disease Low family income	OR=7.07 (2.34-21.4) OR=5.59 (1.38-22.6)		
19	Fernandez-Sola J/ 1995/Spain	Two-phase study (case-control study + cohort study) / (no information)/6 months	50 pairs	18-80 years	High ethanol intake	RR=5.23 (1.43-19.2)		
20	Kang DR/ 2008/Korea	Hospital-based case-control study/2003-2005	255 male cases 255 male controls	19.7 years	Military trainees Total cholesterol: <110 mg/dl (ref. ≥150 mg/dl) Total cholesterol: 110-129 mg/dl (ref. ≥150 mg/dl) Albumin: <3.5 g/dl (ref. ≥4.5 g/dl) Albumin: 3.5-4.4 g/dl (ref. ≥4.5 g/dl) Total protein: <6.0 g/dl	OR=90.71 (8.89-925.91) OR=14.39 (3.8-54.49) OR=5.62 (1.76-17.92) OR=49.0 (3.68-652.33) OR=11.52 (4.65-28.56) OR=5.58 (1.0-31.31)		
21	Palmer KT/ 2003/UK	Case-control study/1996-1999	525 cases 1,122 controls	20-64 years	Exposure to metal fume in the previous year	OR=1.6 (1.1-2.4)		
22	Ruhl CE/ 2001/US	Prospective population-based study/1971-1975	6,928	25-74 years	Reflux esophagitis or hiatal hernia	RR=6.2 (1.1-34.3)		
23	Alperovich M/ 2007/US	Population-based cohort study /1991-2001 /650,377 person-years	11,6671 (only women)	27-44 years	Intake of fatty acid: highest quintile (ref: lowest quintile)	RR=1.35 (1.11-1.66)		
24	Soriano JB/ 2005/UK	Cohort study/ 1998 /at least 1 year	2,699 with COPD 2,699 without COPD 7,931 with asthma 7,931 without asthma	COPD: 65 years Asthma: 30 years	COPD Asthma	RR=16.0 (p<0.05) RR=4.0 (p<0.05)		

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表 1. 肺炎の罹患に関連する因子 (続き)

Ref. No.	First author/Year/Country	Study Design/Year/Follow-up period	Subjects (M: male, F: female)	Mean (or median) age (M: male, F: female)	Variables	Risk factor	Association	Variables	Preventive factor	Association
25	Schlenger RG/2007/UK	Population-based nested case-control study/ 1995-2002	1,253 cases (M681, F:572) 4,838 controls (M2,639, F:2,199)	30-79 years	Current smoker (ref: never smoker) Former smoker (ref: never smoker) Number of general practitioner visit: 5-14 (ref: 1-4) Number of general practitioner visit: 15-29 (ref: 1-4) Number of general practitioner visit: ≥30 (ref: 1-4) Diabetes mellitus Asthma or COPD Ischemic heart disease or chronic heart failure Stroke Venous thromboembolism or pulmonary embolism Rheumatoid arthritis Depression or bipolar disorder Epilepsy Alcoholism or alcohol abuse Cardiovascular use: <60 days (ref: none) Cardiovascular use: ≥60 days (ref: none)	OR=1.81 (1.53-2.15) OR=1.40 (1.17-1.68) OR=1.85 (1.01-3.39) OR=2.82 (2.18-3.66) OR=3.73 (3.14-4.42) OR=1.45 (1.21-1.73) OR=2.33 (2.03-2.67) OR=2.28 (1.87-2.78) OR=2.10 (1.74-2.53) OR=1.55 (1.02-2.37) OR=1.46 (1.14-1.88) OR=1.77 (1.54-2.18) OR=2.81 (1.83-4.30) OR=1.85 (1.19-2.88) OR=3.72 (3.09-4.49) OR=1.23 (1.04-1.44)	BMI: ≥30 (ref: <25)		OR=0.81 (0.66-0.99)	
26	Pascual-Ramos V/2006/Mexico	Hospital-based case-control study/(no information)	30 cases 30 hospitalized controls 30 ambulatory controls (only women)	Case: 39 years Hospitalized controls: 39 years Ambulatory controls: 39 years	Serum creatinine: >3 mg/dl Low serum albumin levels ESR: >50 mm Third-degree caries	OR=7.8 (1.4-42.9) OR=5.1 (1.97-13.68) OR=3.1 (1.03-9.21) OR=7.5 (2.05-27.30)				
27	Myles PR/ 2009/UK	Population-based case-control study/ 2001-2002	3,709 cases (M: 1,710, F: 1,999) 22,174 controls (M: 10,200, F: 11,974)	≥40 years	Ischaemic heart disease Current smokers Chronic lung disease Charlson comorbidity index score: 1-2 (ref: 0) Charlson comorbidity index score: 3-5 (ref: 0) Charlson comorbidity index score: ≥6 (ref: 0) Steroids Antacids Diuretics Calcium channel blockers Nitrates Previous pneumonia episodes Townsend deprivation score: highest quintile (ref: lowest quintile)	OR=1.4 (1.2-1.5) OR=1.7 (1.6-1.8) OR=2.9 (2.7-3.2) OR=2.5 (2.3-2.7) OR=4.0 (3.6-4.4) OR=7.9 (6.3-10.0) OR=2.8 (2.6-3.0) OR=1.4 (1.1-1.8) OR=1.9 (1.7-2.0) OR=1.3 (1.2-1.4) OR=1.4 (1.3-1.5) OR=4.1 (3.6-4.8) OR=1.6 (1.4-1.8)				
28	Merchant AT/ 2005/Canada and US	Prospective cohort study/1990-2000/10 years	38,378 male	44-79 years				Linoleic acid intake (per 1g/d increment)		RR=0.96 (0.93-0.99)
29	Sarkar M/ 2008/US	Nested case-control study/1987-2002	80,066 cases 799,881 controls	Case: 74 years Control: 50 years	Current PPI use that was started within 2 days Current PPI use that was started within 14 days	OR=6.53 (3.95-10.8) OR=3.21 (2.46-4.18)				

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表 1. 肺炎の罹患に関連する因子 (続き)

Ref. No.	First author/Year/Country	Study Design/Year/Follow-up period	Subjects (M: male, F: female)	Mean (or median) age (M: male, F: female) years	Risk factor		Preventive factor	Association
					Variables	Association		
30	Almirall J/ 1999/ Spain	Population-based case-control study/1993-1995	205 cases (M:55% F:45%) 475 controls	Case: M 56 years, F 51 years	Variables BMI: underweight (ref: normal) Ex-smokers (ref: non-smoker) Smoking amount: >20 cigarettes/day Life smoking (for each 10-pack ·yr ⁻¹) Chronic bronchitis Asthma Liver disease Aminophylline Plastic pear-spacers (used to deliver inhalation therapy)	Association OR=2.01 (1.06-3.81) OR=2.16 (1.26-3.69) OR=3.89 (1.75-8.64) OR=1.19 (1.07-1.33) OR=3.20 (1.98-5.15) OR=2.12 (1.01-4.47) OR=2.60 (1.04-6.51) OR=2.53 (1.03-6.18) OR=2.94 (1.52-5.71)	Variables	Association
31	Gulmez SE/ 2007/Denmark	Population-based case-control study/2000-2004	7,642 cases 34,176 controls	Case: 56 years Control: 57 years	Current use of PPI Recent initiation of treatment with PPI	OR=1.5 (1.3-1.7) OR=5.0 (2.1-11.7)		
32	Puing-Barbera J/ 1997/Spain	Hospital-based case-control study/1994-1995	83 cases (M: 58%, F: 42%) 166 controls (M: 58%, F: 42%)	≥ 65 years	Cardiopathy COPD Diabetes	OR=2.2 (1.2-4.0) OR=5.8 (3.1-11.1) OR=3.5 (1.6-7.5)		
33	Vila-Corcoles A/ 2009/Spain	Population-based cohort study/ 2002-2005/ 40 months	11,241 (M: 4,892, F:6,348)	>65 years	Age: 75-84 years (ref: 65-74 years) Age: >85 years (ref: 65-74 years) Male History of hospitalization for community acquired pneumonia in the previous 2 years Chronic lung disease Chronic heart disease Chronic liver disease Cancer Corticosteroid therapy	HR=1.61 (1.32-1.97) HR=2.87 (2.20-3.73) HR=1.24 (1.12-1.37) HR=3.81 (2.64-5.51) HR=2.91 (2.35-3.61) HR=1.46 (1.16-1.84) HR=1.82 (1.14-2.89) HR=1.56 (1.02-2.37) HR=1.87 (1.44-2.41)		

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表 1. 肺炎の罹患に関連する因子 (続き)

Ref. No.	First author/Year/Country	Study Design/Year/Follow-up period	Subjects (M: male, F: female)	Mean (or median) age (M: male, F: female)	Variables	Risk factor	Association	Variables	Preventive factor	Association
34	Jackson ML / 2008 / US	Population based case-control study / 2000-2003	1,173 cases 2,346 controls	65-94 years	Asthma, no exacerbation (ref: no asthma) Asthma, with visit(s) for exacerbation (ref: no asthma) Ever smoked, dose not recorded (ref: non-smoker) Ever smoked, dose recorded in chart (ref: non-smoker) Medication for lung disease Antibiotics to treat lung disease FEV ₁ >80 L (ref: never measured) FEV ₁ 50-80 L (ref: never measured) FEV ₁ <50 L (ref: never measured) Home oxygen COPD, no exacerbation (ref: no COPD) COPD, steroids for exacerbation (ref: no COPD) Oxygen saturation tested during baseline Congestive heart failure, no exacerbation (ref: no congestive heart failure) History of coronary revascularisation History of stroke Needs assistance bathing Needs assistance dressing Needs assistance eating Needs assistance using toilet Needs assistance walking Number of outpatient visits in previous year (continuous) Oral corticosteroids Bronchodilators Statins Antipsychotics Pneumonia in past year	OR=1.9 (1.5-2.4) OR=3.3 (2.6-4.2) OR=1.5 (1.3-1.7) OR=2.5 (2.1-3.0) OR=3.2 (2.8-3.6) OR=3.1 (2.7-3.5) OR=3.0 (1.9-4.6) OR=3.9 (2.8-5.4) OR=8.3 (5.5-12.5) OR=9.7 (6.4-14.7) OR=3.3 (2.8-3.8) OR=7.5 (5.3-10.6) OR=5.1 (4.2-6.3) OR=3.0 (2.3-3.8) OR=3.3 (2.5-4.3) OR=1.4 (1.1-1.9) OR=3.6 (2.1-6.3) OR=2.4 (1.3-4.3) OR=4.0 (1.5-10.4) OR=2.4 (1.3-4.5) OR=1.8 (1.5-2.1) OR=1.04 (1.03-1.04) OR=3.7 (3.0-4.5) OR=3.5 (3.0-4.1) OR=5.7 (4.4-7.4) OR=2.0 (1.2-3.3) OR=4.6 (3.7-5.8)				

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表 1. 肺炎の罹患に関連する因子 (続き)

Ref. No.	First author/Year/Country	Study Design/Year/Follow-up period	Subjects (M: male, F: female)	Mean (or median) age (M: male, F: female)	Variables	Risk factor	Association	Variables	Preventive factor	Association
35	Jackson ML / 2009 / US	Population-based case-control study / 2000-2002	1,173 cases 2,346 controls (M:51%, F:49%)	65-94 years	Lung disease, no medication or oxygen (ref: no lung disease) Lung disease with medication but not oxygen (ref: no lung disease) Lung disease, using oxygen (ref: no lung disease) Prior pneumonia episode Former smoker (ref: never smoked or no smoking data) Current smoker (ref: never smoked or no smoking data) Non-congestive heart failure heart disease (ref: no heart disease) Mild congestive heart failure (ref: no heart disease) Severe congestive heart failure (ref: no heart disease) Dementia Blindness or severe vision impairment Needs assistance bathing Needs assistance dressing Needs assistance eating Needs assistance with toilet Walk with cane (ref: walks without assistance) Walk with walker (ref: walks without assistance) Uses wheelchair or bedridden Number of functional impairments (continuous) Number of functional impairment: 1 (ref: 0) Number of functional impairment: ≥2 (ref: 0) Sex-specific weight: lowest quantile (ref: middle quantile)	OR=2.5 (1.9-3.3) OR=2.9 (2.6-3.4) OR=13.8 (9.3-20.6) OR=4.1 (3.3-5.0) OR=1.7 (1.5-2.0) OR=2.5 (2.0-3.2) OR=1.3 (1.1-1.4) OR=2.8 (2.2-3.5) OR=5.2 (3.8-7.1) OR=1.4 (1.1-1.9) OR=1.6 (1.1-2.4) OR=3.6 (2.1-6.3) OR=2.4 (1.3-4.3) OR=4.0 (1.5-10.4) OR=2.4 (1.3-4.5) OR=1.5 (1.2-1.8) OR=2.0 (1.5-2.6) OR=2.6 (1.8-3.7) OR=1.5 (1.3-1.7) OR=1.7 (1.5-2.1) OR=2.8 (1.8-4.3) OR=1.8 (1.5-2.1)				

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表 1. 肺炎の罹患に関連する因子 (続き)

Ref. No.	First author/Year/Country	Study Design/Year/Follow-up period	Subjects (M: male, F: female)	Mean (or median) age (M: male, F: female)	Risk factor	Association	Variables	Preventive factor	Association
36	Loeb M/ 2009/Canada	Population-based case-control study /2002-2005	717 cases (M:429 F:288) 867 controls (M:273 F:594)	Case: 79 years Control: 74 years	<p>Supplement use, zinc</p> <p>Immunosuppressive medications</p> <p>Nutritional score: 0-60</p> <p>Lifetime smoking: >100 cigarettes</p> <p>Current exposure to tobacco smoking</p> <p>Exposure to secondhand smoking</p> <p>Use of cigars in the previous month</p> <p>Use of pipes in the previous month</p> <p>History of regular exposure to gases, fumes or chemical at work</p> <p>Current and/or previous work in a dusty environment</p> <p>Use of an air humidifier in the previous year</p> <p>Use of a home air filter or air purifier in the previous year</p>	<p>OR=2.39 (1.63-3.50)</p> <p>OR=20.49 (9.91-42.36)</p> <p>OR=1.54 (1.41-1.69)</p> <p>OR=2.86 (2.31-3.56)</p> <p>OR=1.72 (1.30-2.27)</p> <p>OR=1.39 (1.07-1.80)</p> <p>OR=5.84 (1.67-20.39)</p> <p>OR=4.37 (1.43-13.34)</p> <p>OR=3.79 (3.02-4.75)</p> <p>OR=2.60 (1.75-4.13)</p> <p>OR=1.39 (1.14-1.71)</p> <p>OR=1.32 (1.07-1.62)</p>	<p>Supplement use, multivitamins</p> <p>Use of a fireplace in the previous year</p>		<p>OR=0.60 (0.48-0.73)</p> <p>OR=0.69 (0.54-0.87)</p>
37	Hennessy S/ 2007/UK	Population-based case-control study/1987-2002	12,044 cases (M: 5,836 F: 6,208) 48,176 controls (M: 18,484 F: 29,692)	case: 81 years control: 75 years	<p>Male</p> <p>Diagnosis ever in past: anterior horn motor neuron disease</p> <p>Diagnosis ever in past: anxiety</p> <p>Diagnosis ever in past: bipolar disorder</p> <p>Diagnosis ever in past: COPD</p> <p>Diagnosis ever in past: cerebrovascular disease</p> <p>Diagnosis ever in past: depression</p> <p>Diagnosis ever in past: dysphagia</p> <p>Diagnosis ever in past: herpetic neuralgia / herpes zoster</p> <p>Diagnosis ever in past: insomnia</p> <p>Diagnosis ever in past: parkinson's disease</p> <p>Diagnosis ever in past: parkinson's status</p> <p>Diagnosis ever in past: poor nutritional status</p> <p>Diagnosis ever in past: schizophrenic disorders</p> <p>Diagnosis ever in past: senile dementia</p> <p>Drugs prescribed ever in past: antipsychotic</p> <p>Drugs prescribed ever in past: anti-parkinsonian</p> <p>Drugs prescribed ever in past: barbiturate</p> <p>Drugs prescribed ever in past: benzodiazepine</p> <p>Drugs prescribed ever in past: mood stabilizer</p> <p>Drugs prescribed ever in past: opiate</p> <p>Drugs prescribed ever in past: PPI</p> <p>Currently prescribed drugs: antidepressant</p> <p>Currently prescribed drugs: cyclic</p> <p>Currently prescribed drugs: SSR/ SSNRI</p> <p>Currently prescribed drugs: anti-parkinsonian</p> <p>Currently prescribed drugs: antipsychotic</p> <p>Currently prescribed drugs: barbiturate</p> <p>Currently prescribed drugs: benzodiazepine</p> <p>Currently prescribed drugs: histamine H-2 receptor antagonist</p> <p>Currently prescribed drugs: opiate</p> <p>Currently prescribed drugs: PPI</p>	<p>ORE=1.71 (1.63-1.78)</p> <p>ORE=1.57 (1.49-1.65)</p> <p>ORE=7.29 (3.95-13.47)</p> <p>OR=1.30 (1.22-1.39)</p> <p>OR=2.50 (1.61-3.88)</p> <p>OR=3.92 (3.67-4.18)</p> <p>OR=2.04 (1.91-2.17)</p> <p>OR=1.75 (1.65-2.38)</p> <p>OR=2.10 (1.85-2.38)</p> <p>OR=1.15 (1.06-1.25)</p> <p>OR=1.55 (1.46-1.63)</p> <p>OR=1.82 (1.52-2.19)</p> <p>OR=2.84 (2.18-3.70)</p> <p>OR=1.49 (1.11-2.00)</p> <p>OR=2.24 (1.97-2.54)</p> <p>OR=1.59 (1.51-1.67)</p> <p>OR=2.24 (1.99-2.53)</p> <p>OR=1.73 (1.33-2.24)</p> <p>OR=1.79 (1.71-1.88)</p> <p>OR=1.91 (1.35-2.71)</p> <p>OR=1.93 (1.83-2.04)</p> <p>OR=1.68 (1.56-1.81)</p> <p>OR=1.61 (1.46-1.78)</p> <p>OR=1.57 (1.40-1.77)</p> <p>OR=1.65 (1.36-1.99)</p> <p>OR=1.61 (1.35-1.92)</p> <p>OR=1.82 (1.64-2.02)</p> <p>OR=1.64 (1.13-2.38)</p> <p>OR=1.55 (1.44-1.67)</p> <p>OR=1.37 (1.25-1.52)</p> <p>OR=3.29 (2.91-3.71)</p> <p>OR=3.12 (1.24-7.85)</p>			

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表 1. 肺炎の罹患に関連する因子 (続き)

Ref. No.	First author/Year/Country	Study Design/Year/Follow-up period	Subjects (M: male, F: female)	Mean (or median) age (M: male, F: female)	Risk factor		Preventive factor	Association
					Variables	Association		
38	Dublin S/ 2009/US	Population-based case-control study/ 2000-2002	1,125 cases 2,235 controls	Case: 77 years Control: 76 years	Current Statin use	OR=1.61 (1.08-2.39)		
39	Skull SA/ 2009/Australia	Hospital-based case cohort study/2000-2002	Case: 1,952 (M:57.7% F:42.3%) Cohort: 2,927 (M:50.9% F:49.1%)	Case: 78 years Cohort: 76 years	Male gender Living in own home (ref. group) Diabetes Immunosuppression Renal disease Aspiration Past history of pneumonia Excess alcohol intake	RR=1.34 (1.18-1.53) RR=1.41 (1.17-1.70) RR=1.22 (1.05-1.42) RR=1.35 (1.16-1.57) RR=1.57 (1.26-1.94) RR=2.19 (1.20-3.99) RR=2.30 (1.83-2.89) RR=1.34 (1.03-1.74)	Reumatological disease English as the first language Pneumonia in the past year	RR=0.82 (0.69-0.98) RR=0.80 (0.69-0.93) RR=0.66 (0.46-0.94)
40	Riquelme R/ 1997/Spain	Case-control study/1993-1994	101 pairs (M:67, F:34)	78 years	Delirium on admission	Case 45%; control 29%; P=0.019		
41	Okaishi K./ 1999/Japan	Case-control study/1996-1997	55 cases (M:10) 220 controls (M:40)	Case: 81 years Control: 81 years			ACE inhibitor user (ref. non-user) ACE inhibitor user; long acting (ref. non-user)	RR=0.38 (0.15-0.97) RR=0.24 (0.07-0.86)
42	Takahashi T/ 2005/Japan	Case-control study/1999	105 cases 420 controls	Case: 83 years Control: 83 years	Lung disease Bedridden state	OR=1.91 (1.16-3.14) OR=1.65 (1.04-2.62)		
43	Quagliariello V/ 2005/US	Cohort study/2001-2003/12 months	613 (M: 153 F: 460)	85 years	Inadequate oral care Swallowing difficulty	HR=1.60 (1.06-2.35) HR=1.65 (1.04-2.62)		
44	Sund-Levander M/ 2003/Sweden	Prospective cohort study/ 2000-2001/ 1 year	234 nursing home residents (M:78, F:156)	85 years	COPD ADL status: high dependency Male	OR=5.6 (1.8-17.7) OR=5.3 (1.7-16.8) OR=3.2 (1.4-7.8)	Heart disease	OR=0.3 (0.1-0.7)
45	Rothan-Tondue M/ 2003/France	Hospital-based case-control study/1999	75 cases (M:25 F:50) 150 controls (M:50 F:100)	Case: 87 years Control: 85 years	History of nosocomial pneumonia Oxygen therapy Malnutrition Heart failure Antibiotic therapy during the last month Eating dependency	OR=4.50 (2.17-9.35) OR=16.15 (1.89-137.67) OR=4.81 (1.22-20.43) OR=2.57 (1.38-4.19) OR=3.20 (1.78-5.74) OR=1.87 (1.02-3.40)		
46	Munn MB/ 1999/US	Hospital-based case-control study /1988-1995	59 cases 118 controls (only women)	(Pregnant women)	Asthma Anemia	OR=5.07 (P=0.013) OR=7.78 (P=0.005)		

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表 2. 肺炎による入院に関連する因子

Ref. No.	First author/Year/Country	Study Design/Year/Follow-up period	Subjects (M: male, F: female)	Mean (or median) age (M: male, F: female)	Risk factor		Preventive factor	Association
					Variables	Association		
47	Lopez Bravo JM/ 1997/Chile	Prospective birth cohort study/1991-1992/18 months	437 neonates (M:234, F:203)	Neonate	(Cumulative incidence of hospitalization) Boy vs girl Sibling: yes vs no Birth weight: 2500-2999g vs ≥3000 g Duration of total breastfeeding: <4 months vs ≥4 months Maternal schooling: <8 years vs ≥8 years Socioeconomic level: low vs high	OR=2.38 (1.51-3.77) OR=2.23 (1.47-3.37) OR=2.18 (1.42-3.35) OR=2.16 (1.43-3.28) OR=8.70 (1.00-75.1) OR=3.55 (1.18-16.66) OR=2.33 (1.25-4.38) OR=8.34 (4.42-15.74) OR=1.56 (1.07-2.27)	Family history of acute respiratory illness	OR=0.61 (0.39-0.96)
48	Hassan MK/ 2001/Iraq	Hospital-based case-control study/1990-1997	148 cases 250 controls	2 months-5 years	Maternal education: low Paternal education: low Birth order: ≥4 Smoking at home Prematurity No DTP vaccination Weaning from breast milk at <6 months of age Pallor Malnutrition	OR=2.07 (1.11-3.86) OR=1.32 (1.07-1.63) OR=2.14 (1.02-4.46) OR=9.17 (5.18-16.21) OR=2.66 (1.74-4.06) OR=9.10 (3.84-21.56) OR=11.10 (6.42-19.19)		
49	de la Hoz F/ 2004/Colombia	Hospital-based case-control study/1998-2001	389 cases 774 controls	Mean: 12 months Median: 11 months	Cooking in the sleeping room Number of smokers in the house (continuous) Smoker mother Day care attendance Crowding Underlying illness Prior hospitalization for respiratory illness	OR=16.7 (7.7-36.0) OR=61.1 (19.0-195.5) OR=13.4 (7.6-23.5) OR=175 (21.8-1405.1)		
50	Cesar JA/ 1999/Brazil	Nested case-control study/1993	152 cases 2,391 controls	<12 months	Not being breast fed Age: <3months Supplementation with solids Those under 3 months old with solid supplementation	OR=1.73 (1.14-2.64) OR=1.71 (1.13-2.59)	Age: 7-12 months (ref: 2-6 months) Age: 13-24 months (ref: 2-6 months) Age: 25-60 months (ref: 2-6 months) Number of sharing bedroom: ≥2 persons	OR=0.40 (0.21-0.75) OR=0.39 (0.19-0.77) OR=0.21 (0.11-0.38) OR=0.58 (0.38-0.88)
51	Shah N/ 1994/India	Hospital-based case-control study/1991	400 cases (Number of controls: no information)	<60 months	Father's education: <middle school (ref: ≥middle school school) Mother's education: <middle school (ref: ≥middle school) Treatment outside Hypovitaminosis A Outdoor pollution	OR=1.64 (6.66-20.52) OR=1.93 (1.19-3.13) OR=2.05 (1.06-4.01)	Child contact	OR=0.60 (0.41-0.88)
52	Farr BM/ 2000/US	Hospital-based case-control study/ 1982-1983	178 cases (M:108, F:70) 385 controls (M:209, F:176)	18-75 years	Age: 40-59 years (ref: <40 years) Age: ≥60 years (ref: <40 years) Unmarried Unemployed Dusty occupation COPD Asthma Tuberculosis Number of having colds per year: ≥3 Pneumonia in childhood Heart failure Any drug Digitalis Glucocorticoids Bronchodilators Ever smoker	OR=1.6 (1.01-2.53) OR=2.85 (1.85-4.46) OR=1.74 (1.19-2.54) OR=2.16 (1.17-3.96) OR=2.46 (1.59-3.80) OR=4.40 (2.76-7.00) OR=4.06 (2.11-7.84) OR=3.93 (1.14-13.6) OR=1.83 (1.25-2.69) OR=3.02 (1.75-5.22) OR=3.24 (1.41-7.46) OR=2.6 (1.80-3.75) OR=6.76 (1.81-25.3) OR=4.69 (1.94-11.6) OR=9.2 (4.58-18.5) OR=1.84 (1.20-2.83)		

表 2. 肺炎による入院に関連する因子 (続き)

Ref. No.	First author/Year/Country	Study Design/Year/Follow-up period	Subjects (M: male, F: female)	Mean (or median) age (M: male, F: female)	Variables	Risk factor	Association	Variables	Preventive factor	Association
53	Jensen-Fangel S/2004/Denmark	Population-based retrospective observational study /1995-1999/8,041,255 person-years	The entire Danish population under age of 25 years in Denmark	<25 years	Male (strata: 0-5 years) Male (strata: 5-9 years) Male (strata: 15-19 years)		RR=1.27 (1.24-1.32) RR=1.30 (1.21-1.41) RR=1.16 (1.01-1.34)			
54	Mannino DM/2009/US	Prospective cohort study/1988-1990/3 years	20,375 (M:9,073, F:11,302)	≥45 years	Age: 60-64 years (ref: 45-49 years) Age: 65-71 (ref: 45-49 years) Age: 72-75 (ref: 45-49 years) Age: 76-79 (ref: 45-49 years) Age: ≥80 (ref: 45-49 years) Male Current smoker (ref: never smoker) Education: 12 years (ref: >12 years) Education: <12 years (ref: >12 years) Diabetes Cardiovascular disease BMI: <20 (ref: 20-24) GOLD category: 3 or 4 (ref: normal) GOLD category: 2 (ref: normal) GOLD category: 1 (ref: normal) GOLD category: 0 (ref: normal) *GOLD: Global Initiative on Obstructive Lung Disease		HR=2.25 (1.08-4.70) HR=4.10 (1.44-11.7) HR=5.95 (2.84-12.5) HR=10.7 (5.21-22.0) HR=18.3 (9.17-36.5) HR=1.79 (1.30-2.47) HR=2.21 (1.52-3.22) HR=1.45 (1.02-2.03) HR=1.43 (1.03-2.01) HR=1.77 (1.26-2.49) HR=2.20 (1.65-2.94) HR=1.82 (1.08-3.06) HR=5.85 (3.28-9.67) HR=2.25 (1.35-3.75) HR=1.43 (0.88-2.30) HR=1.41 (0.86-2.31)			
55	Metlay JP/2006/US	Case-control study/2002-2004	233 cases (M: 42%) 609 controls (M: 31%)	≥60 years: case 55%, control 31%	Age: 45-59 years (ref: 18-44) Age: 60-74 years (ref: 18-44) Age: ≥75 years (ref: 18-44) Male sex Education: ≥high school Any lung disease Any heart disease Presence of children aged ≥6 years in the household		OR=2.0 (1.2-3.6) OR=2.8 (1.5-5.2) OR=3.9 (1.9-7.9) OR=1.9 (1.3-2.9) OR=4.2 (2.6-7.0) OR=3.4 (2.0-5.7) OR=3.1 (2.0-4.7) OR=2.1 (1.2-3.8)	Pneumococcal polysaccharide vaccination of the youngest child in the home (among those live with at least one child aged ≤6 years)	OR=0.2 (0.1-0.8)	
56	Ohmit SE/1995/US	Hospital-based case-control study/1990-1991 and 1991-1992	<1990-1991> 667 cases 1530 controls <1991-1992> 890 cases 1871 controls	≥65 years	<1990-1991, during peak influenza activity> Lung disease Heart disease Cancer <1990-1991, during non-peak influenza activity> Lung disease Heart disease Diabetes <1991-1992, during peak influenza activity> Lung disease Heart disease Cancer <1991-1992, during non-peak influenza activity> Lung disease Heart disease Stroke Diabetes	OR=4.63 (3.23-6.62) OR=1.65 (1.19-2.31) OR=2.00 (1.35-2.96) OR=4.22 (2.84-6.25) OR=2.44 (1.72-3.46) OR=1.99 (1.23-3.23) OR=5.56 (3.96-7.81) OR=1.96 (1.46-2.63) OR=1.57 (1.06-2.34) OR=4.26 (3.09-5.87) OR=1.62 (1.22-2.15) OR=1.59 (1.07-2.37) OR=2.00 (1.37-2.92)				

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