

は全体の約 25% 前後であり、認知症など危険な要素がなくても発生している事例も少数ではあるがみられ、必ずしも予測は容易ではないと思われた。さらに、老人施設に入所するなど福祉サービスを利用している割合は約 20% と低く、今後、徘徊による事故や死亡予防への対策の余地もある様に思われた。

はじめに

我が国が高齢化社会と言われるようになって久しい。「高齢社会白書」によると平成 21 年の高齢化率(総人口に占める 65 歳以上の人の割合)は日本全体では 22.7% となり、国連による「高齢化社会」の定義となっている 7% をはるかに超えている [1]。ここで、核家族化や地域社会の変化の影響で高齢者の「孤立死・孤独死」が社会問題と扱われる様になってきた。保健福祉政策も高齢者を対象として在宅介護や医療に力が注がれる傾向がある。一方、高齢化社会と核家族化をはじめとした社会構造の変化は介護システムや孤独死等の新たな課題を生み出している。この現象は異状死体の内容にも変化を生じており、我々の調査では、日常行動に障害があったり障害・介護認定を受けている高齢者では事故・災害死の割合が高いこと [2] や孤独死の実態についての地域差 [3] についても明らかになってきている。さらに、これら事故や孤独死の他に、高齢者の自殺や介護殺人等が高齢者死亡や介護福祉の課題として挙げられる。

さらに、これらと関連して、高齢者の検案・法医解剖事例には徘徊の結果死亡した事例もみられる。特に人口密度が低く山や河川・用水路が多い地域を多く持つ山形県では、行方不明の後死亡して発見された事例は多いと考えられる。徘徊老人の実態はあまり明らかになっていないが、「社団法人呆け老人をかかえる家族の会」会員を対象とした調査では認知症の老人の 79.1% に徘徊の経験があり、月間の徘徊の頻度は 30 回以上が 34.6% にみられたと報告もある [4]。我々は昨年高齢者の孤独死と関連して、山形県の検案データより山形県の徘徊老人の実態調査を実施し、死因として凍死や溺死が多いこと、死体発見までに要した時間は多くの事例では 1 日以内で、発見場所も自宅から近距離にある事例が多いことなどを報告した [5]。今回は前回の報告に加え、徘徊老人死亡事例の実態をより詳細に調べるため、2007~2010 年の間に山形大学で実施した法医解剖事例のうち、65 歳以上の高齢者のうち「行方不明となり屋外で発見され、行方不明となった理由が不明」な「徘徊事例」として、死亡要因の詳細な分析を試みた。

調査方法

本報告では高齢者徘徊事例を「年齢 65 歳以上で、外出後行方不明となり屋外で死亡した事例の内、行方不明となった原因が不明なもの」と定義した。

2007~2010 年の間に山形大学で実施した 65 歳以上の高齢者の法医解剖事例 257 体のうちこの基準にあてはまる「徘徊事例」(39 体;男 17 体,女 22 体)を対象とした。

これらの事例から年齢・性別、死因、家族構成、認知症等の精神疾患、身体疾患、死亡前後の行動、行方不明から発見までの経過時間、自宅から発見場所までの距離、行方不明届の有無等を調べた(表 1)。

調査結果

1. 男女別死因(図 1)

病死は 3 体(男 1 体;女 2 体)で、他はいずれも外因死だった。外因死の原死因は溺死 20 体(男 6 体;女 14 体)が最も多く次いで臓器損傷 7 体(男 3 体;女 4 体)だったが、男性の場合は凍死(合計 6 体で男 5 体)も多く見られた。

2. 発見場所と自宅からの距離

人工水路(用水路、側溝や池) 12 体、河川(川や沢) 10 体、海上・海岸 2 体と水中・水際が多かった。またこれら水路の分布は住宅周辺地域から山間部まで広範囲にわたった。一方、男性の場合は道路上(3 体)や畑・水田(2 体)と死亡発見場所の種類の範囲が広がった。また自宅敷地も 2 体と身近な場所でも死亡していた。(図 2)

自宅と死体発見場所との直線距離は 1 km 未満が 21 体(男 8 体;女 13 体)と最も多く、男女とも 5 km 未満が半数以上を占めた。一方、10 km 以上も 4 体(男女各 2 体)みられ最長 101 km と徒歩以外の手段も利用したと推定される事例もあった。(図 3)

3. 家族構成と死者の病歴

男女とも複数の同居家族がいる場合が 22 体(男 9 体;女 13 体)と全体の半数以上みられたが、息子や兄弟との 2 人暮らしと変則的な家族構成も 5 体(男 1 体;女 4 体)。さらに独居生活者も 6 体(男女各 3 体)見られた(図 4)。

表 1. 調査対象事例一覧

2007～2010年の間に実施された山形県の法医解剖事例のうち、高齢者の徘徊死亡事例を対象事例とした。家族構成で複数とは親子3人以上の同居世帯を、親子とは本報告では息子と死者との2人家族を、兄弟とは同胞との2人家族を指す。

年齢	性別	死因	家族構成	精神神経疾患	身体疾患	行方不明から発見までの時間	死亡前後の状況	自宅と発見場所との距離 (km)	行方不明届提出の有無	備考
1	74 男	外傷性ショック	複数	認知症	脳梗塞	1日	朝居間より行方不明となり、側溝内で死亡していた。	0.2		歩行困難
2	76 男	不詳	独居	認知症	高血圧症	22日	夕方行方不明になり、山中の沢で死亡していた。	7	あり	
3	80 女	冠状動脈硬化症	複数	認知症	糖尿病	7日	夕方訪問先を出た後、山の沢の中で死亡していた。	19	あり	
4	85 男	多発外傷	複数	認知症		2日	午前中自乗車に乗り外出して行方不明になり、水田内で死亡していた。	6.5	あり	徘徊の既往
5	74 女	溺死	複数	認知症うつ病		1日	朝居間より行方不明となり、側溝内で死亡していた。	2	あり	
6	85 男	溺死疑い	夫婦	認知症		21日	昼散歩にでかけ行方不明になり、河川内で死亡していた。	4	あり	歩行困難 徘徊の既往
7	84 男	脳梗塞	複数	認知症		1日	朝居間より行方不明となり、ブドウ畑の中で死亡していた。	0.1	あり	歩行困難 徘徊の既往
8	69 男	溺死	独居		心臓弁膜症	1日	昼居間より行方不明になり、海岸で死亡していた。	9	あり	老人施設入所
9	87 女	溺死	独居		脳内出血	2日	診療所への送迎バス下車後、行方不明になり、海中で死亡し漂流していた。	12	あり	歩行困難 老人施設入所
10	85 女	骨盤骨折	複数	認知症		2日	午後農協に外出後行方不明となり、近所の排水路内で死亡していた。	5.2	あり	デイサービス利用
11	84 女	凍死	独居	認知症	高血圧症	2日	夕食後行方不明となり、テニスコート脇のブロック塀に足が挟まり死亡していた。	0.1		デイサービス利用
12	75 男	凍死	夫婦	アルコール依存症	高血圧症	15時間	夜タクシーで帰宅し自宅の前で降車後行方不明となり、自家所有の空き家前で倒れていた。	0.1		酩酊状態
13	66 男	溺死	複数		糖尿病	2時間	夕方仕事で家を出た後行方不明となり、用水路で死亡していた。	0.1		歩行困難
14	90 女	不詳	複数	認知症		8ヶ月	午後行方不明となり、雑木林の中で死亡していた。	0.7	あり	徘徊の既往
15	76 女	溺死	複数	認知症		5時間	朝自室から行方不明となり、用水路で死亡していた。	1.3	あり	歩行困難 デイサービス利用
16	75 男	溺死	複数		高血圧症	11時間	朝仕事のため外出後行方不明となり、用水路で死亡していた。	0.1	あり	
17	72 男	頭蓋内損傷	夫婦	認知症	糖尿病	7時間	午後散歩に外出し行方不明となり、道路上で死亡していた。	2.6		徘徊の既往
18	78 男	凍死	兄弟		前立腺癌	9日	朝バイクに乗り外出し行方不明となり、山道で倒れて死亡していた。	101	あり	徘徊の既往
19	73 男	凍死	複数	認知症	脳梗塞	7時間	行方不明となり、道路上で死亡していた。	0.3		歩行困難
20	77 女	血胸	独居	認知症	糖尿病	1日	夕方突然行方不明となり、空き地で死亡していた。	2		歩行困難 徘徊の既往
21	83 女	溺死	複数	うつ病	狭心症	1日半	夜寝室から行方不明となり、近所の池の中で死亡していた。	0.2	あり	自殺念慮あり
22	78 女	溺死	複数	認知症うつ病		2日	夜知人宅を訪問後行方不明となり、側溝内で死亡していた。	0.1	あり	
23	83 女	溺死	推定 複数	認知症	狭心症	9時間	夜寝室から行方不明となり、側溝内で死亡していた。	0.1		
24	88 女	溺死	兄弟			14時間	午前中外出後行方不明となり、河川内で死亡していた。	0.4	あり	歩行困難
25	76 女	溺死	複数	認知症		8時間	夕方家事していたが行方不明となり、用水路で死亡していた。	0.3	あり	歩行困難
26	83 女	溺死	推定 親子	認知症		8時間	夜自室から行方不明となり、河川内で死亡していた。	1	あり	
27	81 女	溺死	夫婦	うつ病	気管支喘息	6時間	夜自室から行方不明となり、貯水池の内で死亡していた。	0.7	あり	
28	76 女	頭蓋内損傷	夫婦		高血圧症ヘルペス	1日	昼食後行方不明になり、工事中の橋の下で頭部から出血して倒れていた。	2	あり	
29	83 男	溺死 疑い	複数	認知症		15時間	夜中寝室から行方不明となり、河川内で死亡していた。	1.1	あり	徘徊の既往
30	84 男	凍死	独居	認知症	失明 難聴	3日	午後行方不明となり、河川内で死亡していた。	0.1	あり	歩行困難 デイサービス利用

31	82	男	凍死	複数	うつ病	2日	葬儀のため知人宅を出た後行方不明となり、堤防の法面に停車中の車両の脇で死亡していた。	26	あり	徘徊の既往	
32	76	女	溺死	疑い	複数	高血圧症	1日	昼自室より行方不明となり、側溝内で死亡していた。	0.5		
33	89	女	頭蓋内損傷	親子	認知症 うつ病	1日	昼食後行方不明となり、自宅に隣接する崖の下で死亡していた。	0.1	あり	訪問介護利用	
34	76	女	急性心不全 推定	複数	認知症	12時間	夕食後行方不明となり、河川内で死亡していた。	2	あり	徘徊の既往	
35	83	男	溺死	複数	狭心症	狭心症	1日	夜自室より行方不明となり、河川内で死亡していた。	0.7	あり	
36	86	女	溺死	親子	認知症	肺炎 下垂体腺腫	3時間	夜寝室より行方不明になり、自宅庭の池で死亡していた。	0.1		
37	75	女	溺死	疑い	複数	認知症	17時間	夜行方不明となり、側溝内で死亡していた。	0.8	あり	歩行困難 デイサービス 利用
38	101	女	溺死	推定	複数	認知症	高血圧症	1日半	0.1		
39	71	男	不詳	夫婦	うつ病	脊髄管狭窄 症	40日	朝自転車外出後行方不明となり、山林内で死亡していた。	9	あり	

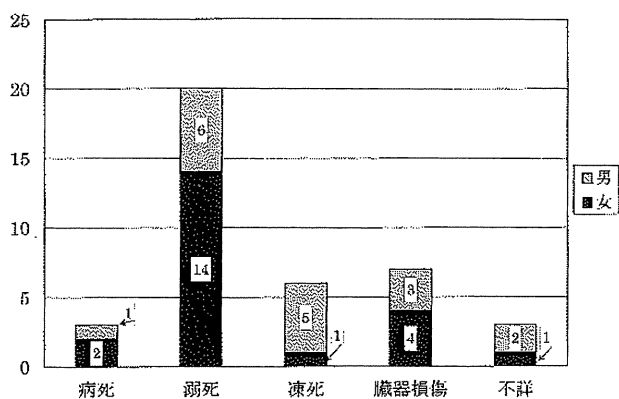


図1. 対象事例の男女別死因
2007～2010年の間に実施された山形県の法医解剖事例のうち、高齢者の徘徊死亡事例を対象事例として死因別事例数を示した。

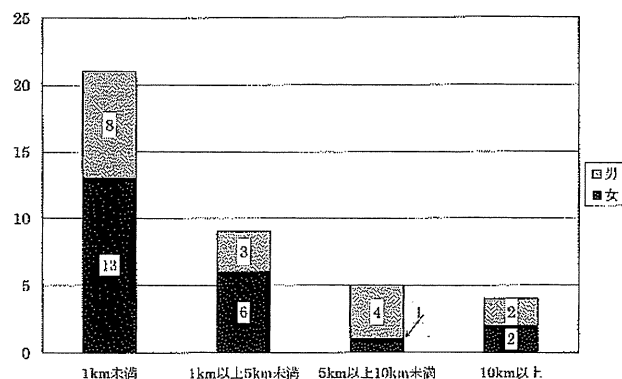


図3. 対象事例の自宅から死体発見場所までの距離
2007～2010年の間に実施された山形県の法医解剖事例のうち、対象事例の死亡者自宅から死体発見場所までの直線距離 (km) 毎の事例数を男女別に示した。

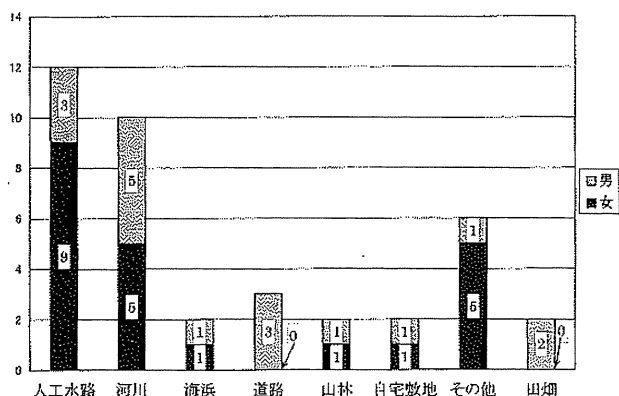


図2. 対象事例の男女別死体発見場所
2007～2010年の間に実施された山形県の法医解剖事例のうち、高齢者の徘徊死亡事例を対象事例として、発見場所毎の事例数を示した。

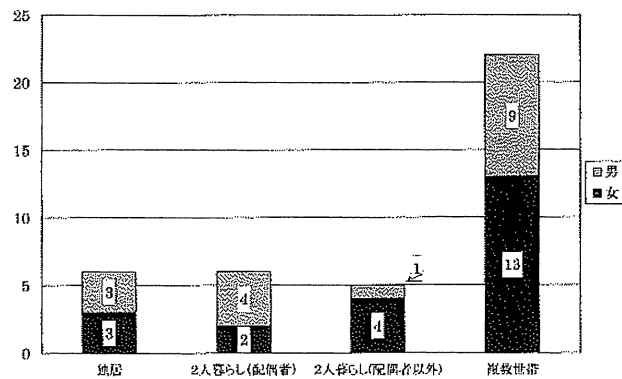


図4. 対象事例の家族構成
2007～2010年の間に実施された山形県の法医解剖事例のうち、対象事例の死亡者の家族構成を男女別に示した。2人暮らし(配偶者以外)とは親子、同胞と2人で暮らしていた事例を指す。

また、行方不明となる重要な誘因となりうる認知症と診断されている事例が25体(男9体;女16体)と半数以上(全体の64.1%)みられ特に女性にその傾向

(女性全体の72.3%)が顕著であった。また、高齢者の調査であることから、高血圧症や糖尿病など生活習慣病を含めた身体疾患も23体(男12体;女11体)

表2. 精神疾患・身体疾患の有病者数
カッコ内は対象事例（男17体；女22体；合計39体）全数に対する各々の該当体数の割合を指す。

		男	女	男女合計
精神疾患	認知症	9 (52.9%)	16 (72.3%)	25 (64.1%)
	うつ病	2 (11.8%)	5 (22.7%)	7 (17.9%)
身体疾患		12 (70.6%)	11 (50.0%)	23 (59.0%)
歩行困難		6 (35.3%)	6 (27.3%)	12 (30.8%)

表3. 徘徊未遂歴や福祉サービスの利用状況
カッコ内は対象事例（男17体；女22体；合計39体）全数に対する各々の該当体数の割合を指す。福祉サービスとはデイサービス、訪問介護サービス、老人入居施設を指す。

	男	女	男女合計
徘徊の既往あり	7 (41.2%)	3 (13.6%)	10 (25.6%)
福祉サービス利用あり	2 (11.8%)	6 (27.3%)	8 (20.5%)

表4. 行方不明届けの提出状況
警察署に行方不明届け（捜索願）の書類を提出し、捜査がなされている件数を示す。カッコ内は対象事例（男17体；女22体；合計39体）全数に対する各々の該当体数の割合を指す。

	男	女	男女合計
提出あり	12 (70.6%)	16 (72.7%)	28 (71.8%)

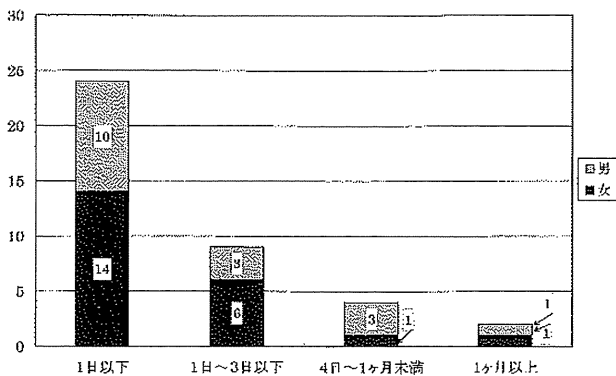


図5. 対象事例の行方不明判明時から死体発見時までの経過時間
2007～2010年の間に実施された山形県の法医学解剖事例のうち、対象事例の死亡者の発見時までの時間経過毎の事例数を男女別に示した。

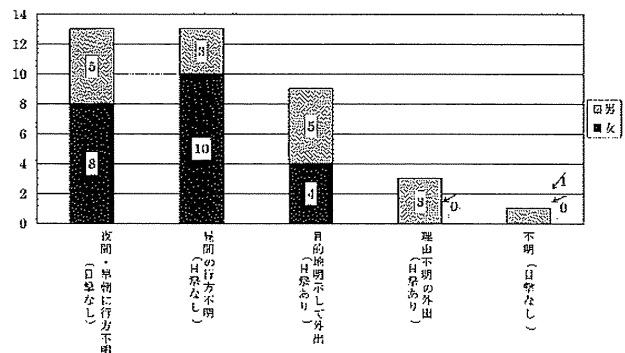


図6. 対象事例の行方不明前後の状況
2007～2010年の間に実施された山形県の法医学解剖事例のうち、対象事例の行方不明時の状況を男女別に類型化して、各々の事例数を示した。

と全体の半数以上（59.0%）みられ男性では70.6%とこの傾向が顕著であった。

さらに、様々な原因により歩行困難を伴っている事例（12体で全体の30.8%）もみられた（表2）。

4. 死者発見前後の状況

行方不明であることが判明してから、死体発見までの経過時間は半数以上の24事例で1日以下と、男女とも75%以上は3日以内に発見されていた（図5）。

5. 徘徊癖や福祉サービス利用状況

過去に徘徊により行方不明となった既往のある事例が10体（男7体；女3体）と全体の25.6%にみられ特に男性（7体；41.2%）にその傾向が強かった。

また、デイサービス、訪問看護、老人施設入所などの福祉サービスを受けている事例は8体（男2体；女6体）と全体の20.5%であった。（表3）

6. 徘徊前後の状況と家族の反応

一方、行方不明届け（捜索願）も28体と全体の71.8%で提出されており、家族側も何らかの対応を行っていることが判明した。（表4）

しかしながら、行方不明になる直前の状況を調べる

と、27体（全体の69.2%）で外出するところを日撃されておらず、「気がついたら居なくなっていた」事例が目立った。一方特に男性の場合、仕事や会合のため外出したきり行方不明になった事例や、その他の事例のなかには、自宅前やデイケア等の施設までの送迎バスやタクシーから降車して、目的地の目の前で行方不明になった事例等様々な状況が数みられた。そして、行方不明になる時間帯は昼間・夜間ともにほぼ同数みられた。（図6）

考 察

高齢者の徘徊事例は2002～2008年の検案データでは高齢者検案総数の1.4%に相当する [5]。もちろん

異状死体の届け出が前提となるため厳密な意味で山形県の徘徊事例全数調査ではないが、事例の経過を考えると事故死や死亡経過が不明解な事例が多いと思われるので相当数が検案対象になっているものと思われる。また前述の報告と同じく、死亡場所では河川・側溝等が多く、家族構成では複数同居家族の事例が多くみられた。さらに、死因も凍死や溺死が多くみられ、多くの事例で行方不明届けが警察署に提出されていた。剖検事例は検案事例で死因などが不明な“変死体”を抽出して実施するため検案データとは母集団が異なる。しかし、検案データと剖検データとを比較すると、ほぼ同様の死亡者の属性を持っていると考えられる。そこで“剖検”という抽出調査ではあるが、今回の報告はある程度徘徊事例全体の傾向を表していると思われる。

さらに、2002～2008年の山形大学における剖検データにおいても、死亡者の既往に認知症単独または認知症とうつ病等他の精神疾患の合併事例が半数でみられ、行方不明から発見までの経過時間が1日以内に発見される事例と、自宅から発見場所（死体発見場所）までの距離は1km以下の事例が最も多かった。

しかしながら、2010年までの新たな剖検データを子細に検討すると、複数家族であっても高齢者同士の2人暮らしなど、相互に支援する体制が取りにくい家族関係である場合があることを考慮に入れる必要がある。そして、死体発見場所は全体では河川や水路等が多いが、男性では仕事など外での活動を反映して、路上や山林など発見場所は多岐に渡っている事例も多くみられた。

また、今回の新たな調査では、行方不明となる契機は「いつの間にか」という事例が多く、夜間就寝中のみならず昼間にも多く見られることが判明した。そして、予定された外出であっても、途中で道に迷うなどにより徘徊を開始し、側溝など危険箇所に入り込んだと思われる事例もみられ、また目的地到着直前に行方不明になるなど、わずかな時間で突然行方不明になる事例もあつことが判明した。これらは普段は問題行動がなくても「まだら認知症」などの関与により突然異常行動を起こす事例も少なからずありうることを示唆させる。

病歴との関係では、徘徊や譫妄状態に認知症は大きな危険要因であるが、認知症の診断があつても6体では散歩や知人宅訪問など目的が明示され家族の日撃があつた（表1）。さらに、過去に徘徊による行方不明の既往がある事例は10体（男7体；女3体）と全体の25.6%に留まっている。従つて、徘徊の背景は様々

な要素が加わることも本調査で確認された。これは、歩行困難、身体疾患、酩酊状態など死亡事故や徘徊後に疾病の急性増悪など死亡経過に影響を及ぼす多数の要因があることも示している。

一方、家族の負担軽減をはかりうる福祉サービスの利用は全体の20.5%程度と余り高率ではなかつた。

このことから前述の突然の異常行動を含め、認知症などの危険因子や問題行動のみから、徘徊を予測することは必ずしも容易でないと思われる。他方、福祉サービスを利用することにより、家族が高齢者に対する支援を集中的に実施したり、独居生活者の徘徊リスクを軽減したりできる余地が未だ残されているとも思われた。さらに、福祉サービスも徘徊の危険性を含めた対策を立案したり、家族内や地域の高齢者を取り巻く人間関係を考慮に入れて活動方針を検討することも重要であると思われた。

結 論

2007～2010年の間に実施された山形県の法医解剖事例のうち、徘徊死亡事例の死亡前後の状況や生活状況を調査した。死因や死体発見場所、死体発見までの経過時間などは検案データと同様であつた。

行方不明前後の状況では、「いつのまにか行方不明」となっている事例が多く、認知症や生活習慣病の既往のある事例が多かつた。一方、少数ながら訪問先が既知であっても途中で突然行方不明になる事例もあることや、徘徊の既往がある事例は比較的少数で、徘徊による行方不明予測が困難な事例も一部にあつた。さらに、福祉サービスを受けている事例は20%前後と低かつた。

これらの結果より、徘徊による行方不明後の死亡事例の予防対策としては現状に合致した福祉サービスの実施も効果がある可能性があること、また死者の異常行動のより詳細な分析も必要であると思われた。

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RESEARCH ARTICLE

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Mothers and daughters-in-law: a prospective study of informal care-giving arrangements and survival in Japan

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Abstract

Background: Daughters-in-law have played an important role in informal care-giving arrangements within East Asian traditional norms. The aim of this study was to measure the impact of daughter-in-law care-giving on the survival of care recipients. We prospectively examined the associations between different types of kinship relationship between the main family caregiver and the care recipient in relation to survival among care recipients.

Methods: A questionnaire was administered to Japanese community-dwelling seniors who were eligible to receive national long-term care insurance (LTCI) community-based services. Among 191 individuals whose informal care-giving arrangement was definitively determined, we observed 58 care recipients receiving care from spouses, 58 from daughters-in-law, 27 from biological daughters, 25 from other relatives, and 23 care recipients living alone.

Results: During 51 months of follow-up from December 2001, 68 care recipients died, 117 survived, and 6 moved. Hazard ratios of each care-giving arrangement were estimated by Cox proportional hazard models adjusted for care recipients' demographic factors, their care needs level based on their physical and cognitive functioning and their service use, caregivers' demographic factors, and household size. The highest risk of mortality was found for female elders receiving care from daughters-in-law (HR 4.15, 95% CI 1.02-16.90) followed by those receiving care from biological daughters (HR 1.64, 95% CI 0.37-7.21), compared to women receiving spousal care. By contrast, male elders receiving care from daughters-in-law tended to live longer than those receiving care from their spouses.

Conclusions: Our finding suggests that there may be a survival "penalty" for older Japanese women who are cared for by their daughters-in-law.

Background

Across societies in East Asia - China, Taiwan, Korea, and Japan - daughters-in-law have played a central role in providing informal care for older people, in accord with Confucian traditions [1-7]. The traditional life course pattern for Japanese women has been to take care of their parents-in-law and their husbands, then subsequently be cared for by their own daughters-in-law [1]. Although some studies have pointed out that the female caregiver role has changed in Japan due to the increasing popularity of westernized values (including the shift from multi-generational to nuclear family

arrangements), and the expanded labor force participation of women, informal care provided by adult children (especially, daughters-in-law living together with their parents-in-law) remains one of the most common sources of care-giving for aging individuals in Japanese society [1,5,6]. According to a national survey, the most common sources of care for Japanese elders are co-habiting spouses (25.9% in 2001, 24.7% in 2004 and 25.0% in 2007), co-habiting children-in-law (22.5% in 2001, 20.3% in 2004 and 14.3% in 2007) and co-habiting biological children (19.9% in 2001, 18.8% in 2004 and 17.9% in 2007)[8-10].

Recent studies have begun to document the potentially deleterious health consequences of intensive care-giving for the health of care providers. For example, Epel and colleagues (2004) [11] demonstrated that women

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providing care to chronically ill children had significant shortening of leukocyte telomere length - a biological marker of stress and accelerated aging. Other studies have also documented the adverse effects of care-giver stress on markers of immune functioning, such as wound healing and response to influenza virus vaccine [12,13]. Indeed, Schulz & Beach [14] demonstrated that spouse caregivers exhibited a greater risk for mortality than non-caregivers. Although a meta-analysis found that caregivers exhibited a slightly greater risk of health problems compared to non care-givers [15], it has not been conclusively established that providing active help produces harmful levels of stress among caregivers [16]. These studies from western contexts, however, mainly focused on spouses as the main family caregiver, not on daughters-in-law.

In a U.S. prospective study of 54 412 middle-aged women free of heart disease at baseline [17], those who reported providing more than 9 hours of care-giving to sick spouses per week were at nearly twice the risk of developing incident coronary heart disease, compared to women reporting no care-giving duties (Relative risk 1.82, 95% CI 1.08-3.05). In the same cohort study, women who reported providing intensive care to sick parents did not exhibit a similar increased risk of heart disease (multivariable-adjusted RR 0.81, 95% CI 0.43-1.53), which the authors interpreted as the reflection of the fact that the responsibilities for providing care to parents can be shared between siblings, whereas care-giving for sick husbands falls primarily on the shoulders of wives - at least in the U.S. social context.

In contrast to the typical North American pattern of informal care delivery, the primary responsibility for elder care in the East Asian traditional norm has fallen on the shoulders of daughters-in-law, not spouses. This distinctive arrangement has given rise to numerous accounts of mother-in-law/daughter-in-law tensions in the popular literature - e.g. see Niwa Fumio's celebrated novella, "The Hateful Age" (1948). Anecdotes aside, there have been very few empirical attempts to establish the health consequences of care-giving in the Japanese context [18-21]. Emerging studies have sought to examine the association between type of familial living arrangement - as a crude proxy for care-giving responsibilities - and the health status of Japanese women. For example, Ikeda and colleagues [19] prospectively examined the association between living arrangement and risk of coronary heart disease incidence and mortality within a cohort of 90 987 Japanese women and men aged 40-69 years, free of cardiovascular disease at baseline. The authors found that women living in multi-generational households (living with spouse-children-parents; or spouse-parents) had 2.0 to 3.0-fold higher risk of coronary heart disease compared to women living

with spouses only. In the same study, Japanese men living in multi-generational households did not experience an increased risk of heart disease compared to those living with their wives only.

In contrast to the foregoing studies which examined the health impact of living arrangement on potential care-givers [14-16], almost no study has examined the effects of different types of care-giving arrangements on the health of the care recipients. Although Merrill [22] suggested that in-law caregivers provide less help to their parents-in-law than blood-tied caregivers, whether these differences translate into different health outcomes for the care recipient remains unknown. Fujino and Matsuda [18] prospectively explored the health impact of 2773 Japanese individuals aged 60 years or older living in Japan, and found that men living with others who were able to provide care to them throughout the day had better survival compared to either men living alone, or living with others who were unable to provide care due to infirmity. By contrast, in the same study, women did not experience the same survival advantage by living with others who were able to provide care for them. The focus of this study, however, was not the relationship of the care-giver to the recipient but rather the former's ability to provide care.

In the present report, we sought to prospectively examine the associations between informal care-giving arrangement (defined by kinship of main family caregiver to the recipient) and care recipients' survival in a cohort of Japanese elders.

Methods

Study population

Our study was conducted in a middle-sized city in rural Japan. The population of the city was around 55 000 in 2001 and around 53 000 in 2006. Following the roll-out of the national long-term care insurance (LTCI) program including community-based services and institutional care services in 2000 [23], 871 older people (696 community-dwelling and 175 institutionalized) had been classified as eligible for the LTCI services by 2001 out of approximately 10 000 older people (65 years or older) in the city. In December 2001, the municipality mailed a questionnaire to a 50% random sample ($n = 348$) of all the community-dwelling care recipients (and their primary care-givers) in order to document their needs related to the services and their living arrangement.

Following return of the questionnaires, the municipal authority followed up each care recipient's vital status and service use within the LTCI system data contained in the Vital Statistics of Population and the long-term care insurance claims from the municipality between 1st December 2001 and 28th February 2006 (51 months).

The municipality thus provided the investigators with three sets of data: questionnaire information, vital status, and LTCI service utilization. The Ethics Committee of University of Tsukuba approved the secondary use of all three set of data and any kind of subsequent statistical analyses by the investigators. All data were obtained without any information that could be used to identify each individual.

A total of 216 care recipient/care-giver dyads returned the baseline questionnaire for a response rate of 62.1%. We excluded ten subjects for whom the age of the care recipient was less than 65 years old, because the eligibility criteria of LTCI for people less than 65 years old differs from that for people 65 years or older [24]. We further excluded 15 subjects who did not answer questions about their informal care-giving arrangement (kinship of main family caregiver). Consequently, we utilized the data of 191 care recipients (54.9%) for our study analyses.

Exposure/covariate assessment

To create the informal care-giving arrangement variable, we utilized information combining the caregiver's gender and kinship relation to the care recipient. Following the classification scheme adopted by the Comprehensive Survey of the Living Conditions of People on Health and Welfare [8], we divided care-giver types into five categories, as follows: a) spousal care (receiving care mainly from co-habiting spouse), b) daughter-in-law care (receiving care mainly from co-habiting daughter-in-law), c) biological daughter care (receiving care mainly from co-habiting biological daughter), d) other relative care (receiving care mainly from other co-habiting relative, such as siblings or grandchildren), and e) living alone.

Other questions asked of the care recipients and their caregivers included demographic information (care recipient's gender and age-group and family caregiver's gender and age-group), and the number of family members living together in the same home. We also recorded the care needs level for each individual at the beginning of the follow-up. All care recipients were classified into six care needs levels, ranging from assistance required to care needs levels 1 through 5, based upon each individual's level of physical and cognitive functioning [24]. The utilization of five types of LTCI services are shown: daycare service (nursing home daycare and health-related daycare), home-help service (home help with care-giving or housekeeping), home-visit nursing, respite stay (short-term nursing home stay), and institutional care (special nursing home, health service facility for the elderly, and sanatorium type medical care facility for the elderly requiring care for a long-term period). All of the five variables were given a dichotomous number based

upon whether care recipients had utilized each LTCI service for at least one month during the follow-up. We selected the one-month cutoff because it is the shortest duration of service use that certified care managers (care planners) are able to assign to the care recipient - and hence likely to be the most sensitive measure of service use [24,25]. Table 1 shows the basic characteristics in December 2001 and the patterns of LTCI service use in our cohort from 1st December 2001 to 28th February 2006.

The outcome of our study was care recipient's survival time. Survival time was monitored during the follow-up period, from 1st December 2001 to 28th February 2006. When individuals died or moved during follow-up, the date of death or the move was recorded. For each individual, length of follow-up period was calculated from 1st December 2001 until the date of death or move from the municipality. Otherwise, individuals were proved to be alive as of 28th February 2006 and recognized as censored cases.

Statistical analysis

We estimated cumulative survival rates 24-months and 48-months after the beginning of follow-up on 1st December 2001 according to the five categories of informal care-giving arrangement for males, females and both genders combined. The difference between the main two categories: spousal care and daughter-in-law care was tested by log-rank statistic, utilizing the Kaplan-Meier method. Because of the small sample size for males, we merged the following categories: receiving biological daughter care, receiving other relative care, and living alone. We checked the proportionality of the Cox proportional hazard models graphically by using the negative log plots of the survivor function, and the interactions among gender and informal care-giving arrangement were explored by Cox models. We then estimated the effect of informal care-giving arrangement for female care recipient's survival by Cox models. A two-tailed p value of less than 0.05 was considered statistically significant. We carried out all the analyses using SAS version 9.1.3.

Results

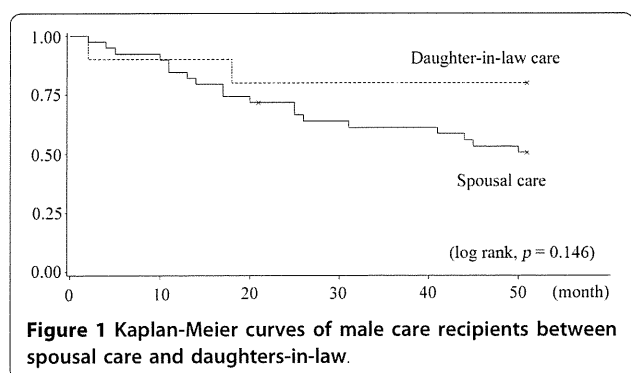
Of the 191 care recipients whom the municipality followed for 51 months, 68 died, 6 moved (and were lost to follow-up), and 117 survived until the study's end, yielding a total of 631.3 person-years of follow-up (188.5 for men and 442.8 for women). Table 1 shows the cumulative survival rates up to 24-months and 48-months following the start of follow-up for male and female care recipients.

In the overall sample, there were no significant differences in survival among the care-giving arrangement

Table 1 Baseline characteristics, formal service use, and survival of community-dwelling elders in a city in Japan

	Informal care-giving arrangement (kinship of main family caregiver)					
	All	(main two categories)		(other three categories)		
		n (%)	Spousal care n (%)	Daughter-in-law care n (%)	Biological daughter care n (%)	Other relative care n (%)
	191 (100)	58 (100.0)	58 (100.0)	27 (100.0)	25 (100.0)	23 (100.0)
Baseline characteristics						
Care recipient's gender						
Female	129 (67.5)	19 (32.8)	48 (82.8)	24 (88.9)	20 (80.0)	18 (78.3)
Male	62 (32.5)	39 (67.2)	10 (17.2)	3 (11.1)	5 (20.0)	5 (21.7)
Care recipient's age-group (year)						
65-79	80 (41.9)	38 (65.5)	20 (34.5)	4 (14.8)	11 (44.0)	7 (30.4)
80-89	81 (42.4)	18 (31.0)	23 (39.7)	18 (66.7)	9 (36.0)	13 (56.5)
90-	29 (15.2)	2 (3.5)	15 (25.9)	5 (18.5)	4 (16.0)	3 (13.0)
Baseline care needs level						
Assistance required	24 (12.6)	2 (3.5)	7 (12.1)	5 (18.5)	4 (16.0)	6 (26.1)
Care needs level 1 and 2	105 (55.0)	34 (58.6)	32 (55.2)	15 (55.6)	11 (44.0)	13 (56.5)
Care needs level 3, 4 and 5	50 (26.2)	18 (31.0)	18 (31.0)	7 (25.9)	5 (20.0)	2 (8.7)
Number of people living together						
0-5	153 (80.1)	46 (79.3)	39 (67.4)	24 (88.9)	22 (88.0)	22 (95.7)
6-	35 (18.3)	11 (19.0)	19 (32.8)	3 (11.1)	2 (8.0)	0 (0.0)
Care-giver's age-group (year)*						
-49	37 (19.4)	1 (1.7)	21 (36.2)	7 (25.9)	8 (40.0)	-
50-59	38 (19.9)	2 (3.5)	18 (31.0)	12 (44.4)	6 (30.0)	-
60-69	40 (20.9)	17 (29.3)	12 (20.7)	7 (25.9)	4 (20.0)	-
70-	47 (24.6)	38 (65.5)	6 (10.3)	1 (3.7)	2 (10.0)	-
Formal service use in follow-up						
Daycare service use						
No	46 (24.1)	19 (32.8)	6 (10.3)	4 (14.8)	10 (40.0)	7 (30.4)
Yes	145 (75.9)	39 (67.4)	52 (89.7)	23 (85.2)	15 (60.0)	16 (69.6)
Home help service use						
No	86 (45.0)	25 (43.1)	31 (53.5)	15 (55.6)	11 (44.0)	4 (17.4)
Yes	105 (55.0)	33 (56.9)	27 (46.6)	12 (44.4)	14 (56.0)	19 (82.6)
Home-visit nursing service use						
No	151 (79.1)	45 (77.6)	46 (79.3)	18 (66.7)	22 (88.0)	20 (87.0)
Yes	40 (20.9)	13 (22.4)	12 (20.7)	9 (33.3)	3 (12.0)	3 (13.0)
Respite stay service use						
No	139 (72.8)	39 (67.2)	40 (69.0)	16 (59.3)	23 (92.0)	21 (91.3)
Yes	52 (27.2)	19 (32.8)	18 (31.3)	11 (40.7)	2 (8.0)	2 (8.7)
Institutional care service use						
No	131 (68.6)	33 (56.9)	47 (81.3)	16 (59.3)	18 (72.0)	17 (73.9)
Yes	60 (31.4)	25 (43.1)	11 (19.0)	11 (40.7)	7 (28.0)	6 (26.1)
Cumulative survival rate	(%)	(%)	(%)	(%)	(%)	(%)
			All			
After 24-month follow-up	79.4	77.6	74.0	88.9	83.3	82.6
After 48-month follow-up	66.0	63.5	56.4	74.1	70.8	82.6
			Male			
After 24-month follow-up	72.6	71.8	80.0	100.0	60.0	60.0
After 48-month follow-up	57.6	53.2	80.0	66.7	40.0	60.0
			Female			
After 24-month follow-up	82.7	89.5	72.7	87.5	89.5	88.9
After 48-month follow-up	70.0	84.2	51.3	75.0	79.0	88.9

* The 29 missing data included all the 23 older people living alone.

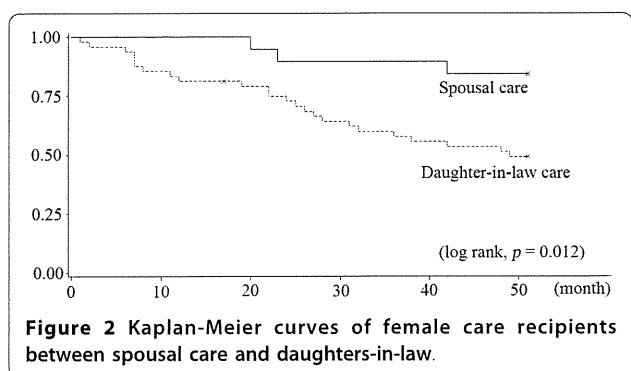


categories (log rank, $p = 0.252$) nor in the comparison between care recipients receiving spousal care versus those receiving daughter-in-law care (log rank, $p = 0.430$). However, this overall finding obscured a significant gender difference in the pattern of survival according to source of care.

Figure 1 shows that male elders receiving care from daughters-in-law had better survival compared to those receiving spousal care (log rank, $p = 0.146$). By stark contrast, among women in our sample, care recipients receiving spousal care had better survival than care recipients receiving daughter-in-law care (log rank, $p = 0.012$) (Figure 2).

Table 2 explored the interaction of the two variables: care recipient's gender and care-giving arrangement. Both male gender ($p = 0.027$) and daughter-in-law care are ($p = 0.022$) risk factors for increased mortality. By contrast, the coefficient of the product term (male care recipient receiving care from a daughter-in-law) was negative ($p = 0.011$). This can suggest that the effect of daughter-in-law care for survival among male care recipients was protective, as opposed to the pattern among female care recipients. The magnitude of the interaction, however, diminished after adjustment for other covariates in Model II ($p = 0.134$).

Gender-specific stratified multivariable analysis was carried out among women care recipients but not among males because of small sample size. Table 3



Model III and IV shows the results of the regression models among female care recipients. Even after controlling for the possible confounding factors (Model IV), women who received care from daughters-in-law were 4.3 times more likely to die during the follow-up period, compared to women receiving care from their spouses. In addition, those who received care from biological daughters were approximately 1.88 times more likely to die, compared to the same reference, but not significant.

Discussion

To our knowledge, this is the first study to examine the associations between kinship of the primary caregiver and survival of care recipients in the Japanese context. The findings are provocative in that they suggest a survival disadvantage for women who are cared for by their daughters-in-law, i.e. a daughter-in-law "penalty."

Potential explanations for the daughter-in-law penalty remain unclear. However, two possible hypotheses to account for the increased risk of mortality among women receiving care from their daughters-in-law are: a) strained emotional relationships between mothers-in-law and daughters-in-law resulting in caregivers' psychological abuse and consequent neglect of care, and/or b) the care recipients' own mental state, which may range from depression to self-neglect.

According to research on elder abuse carried out by Soeda & Araki [26], major perpetrators in Japan tend to be daughters-in-law (30 to 40%). They also found that the most frequent reason given for abuse by daughters-in-law was a poor relationship with their in-laws (60.0%), followed by stress (40.0%). A study by Institute for Health Economics and Policy (2003) found that daughters-in-law were more frequently identified as perpetrators of neglect (62.8%) and psychological abuse (72.7%) compared to physical abuse (34.5%) or financial abuse (17.0%). In turn, mistreatment such as neglect and psychological abuse is one of the major causes of care recipients' death as pointed in an American study, which reported that older people who were mistreated were 3.1 times more likely to die during a 3-year period than those who did not experience abuse [27].

What account for the strained relations between mothers-in-law and daughters-in-law? Indeed, Koyano and colleagues [28] found that biological children were more likely to have closer and better relationships with aging parents than children-in-law. Three characteristics of long-term poor relationships were also described as: a) living with parents-in-law, who are not related, come from a different generation, and have a different lifestyle causes a lot of stress, b) sons who fail to mediate the relationship between their wives and their parents, and c) mothers-in-law who tend to interfere in their sons' family because of their intimate feelings toward

Table 2 Interaction between care recipient's gender and care-giving arrangement in Cox proportional hazard models

Variable names	Model I*		Model II**	
	HR (95% CI)	P	HR (95% CI)	P
Care recipient's gender				
Female	1.00		1.00	
Male	3.97 (1.17 - 13.42)	0.027	5.13 (2.25 - 11.69)	< 0.0001
Informal care-giving arrangement				
Spousal care	1.00		1.00	
Daughter-in-law care	4.09 (1.23 - 13.58)	0.022	4.40 (1.60 - 12.10)	0.004
Other categories (biological daughter care/other relative care/living alone)	1.55 (0.45 - 5.39)	0.491	1.26 (0.55 - 2.90)	0.580
Interaction				
Male gender * Daughter-in-law care	0.09 (0.01 - 0.57)	0.011	0.08 (0.02 - 0.46)	0.004
Male gender * Other categories	0.66 (0.14 - 3.11)	0.601		

* No adjusting variables in this model.

** Adjusting care recipient's age, baseline care needs level, number of people living together, daycare service use, home-help service use, home-visit nursing service use, home-visit nursing use, respite stay, and institutional care use

Table 3 Hazard Ratios of informal and formal setting in female care recipients in Cox proportional hazard models

	Model III (without adjustment)*		Model IV (with adjustment)	
	HR	95% CI	HR	95% CI
Informal care-giving arrangement				
Spousal care	1.00		1.00	
Daughter-in-law care	4.14	(1.25 - 13.77)	4.15	(1.02 - 16.90)
Biological daughter care	1.97	(0.51 - 7.62)	1.64	(0.37 - 7.21)
Other relative care	1.76	(0.42 - 7.35)	1.85	(0.35 - 9.94)
Living alone	0.76	(0.13 - 4.53)	0.46	(0.04 - 5.48)
Care recipient's age (continuous)	1.04	(1.00 - 1.09)	1.02	(0.98 - 1.08)
Baseline care needs level				
Assistance required	1.00		1.00	
Care needs level 1	1.26	(0.40 - 3.95)	1.41	(0.42 - 4.75)
Care needs level 2	1.69	(0.49 - 5.77)	1.45	(0.40 - 5.30)
Care needs level 3	2.80	(0.84 - 9.32)	3.25	(0.92 - 11.46)
Care needs level 4 or 5	3.18	(0.96 - 10.59)	3.21	(0.81 - 12.74)
Number of people living together (continuous)	1.18	(1.01 - 1.38)	0.99	(0.78 - 1.25)
Daycare service use				
No	1.00		1.00	
Yes	0.71	(0.36 - 1.39)	0.51	(0.22 - 1.22)
Home help service use				
No	1.00		1.00	
Yes	0.61	(0.33 - 1.13)	0.64	(0.31 - 1.32)
Home-visit nursing service use				
No	1.00		1.00	
Yes	1.09	(0.54 - 2.23)	0.71	(0.28 - 1.80)
Respite stay service use				
No	1.00		1.00	
Yes	0.95	(0.47 - 1.89)	0.86	(0.38 - 1.94)
Institutional care service use				
No	1.00		1.00	
Yes	0.63	(0.31 - 1.29)	0.88	(0.38 - 2.05)

* Each HR was obtained separately variable by variable.

their sons [26]. Their study also pointed that relationships between daughters-in-law and mothers-in-law are often much worse than relationships between daughters-in-law and fathers-in-law, because daughters-in-law and mothers-in-law have a lot of disputes over the authority to make decisions regarding housework in a Japanese traditional family (a son and his wife living with his parents in the same household).

Some researchers reported the possibility of underutilization of social services under the Japanese LTCI system due to social norms and the opinions of family caregivers [29-31]. Japan introduced legislation addressing elder abuse prevention and caregiver support in 2007 [31], and these initiatives may help to support families with fragile informal care-giving arrangements [30,32].

It is possible that our main findings, including the "daughter-in-law penalty", might reflect confounding by underlying common causes - for example, daughters-in-law may be selectively recruited into providing care for sicker relatives. Additionally, in our study, we did not control for comorbidity or other measures of health status. However, our multivariable analyses did control for baseline differences in the care needs level of the recipients. On the other hand, since the potential unobserved confounders (such as comorbidity) would affect the care-giver arrangement through the "care needs level" variable, we could still obtain an unbiased estimate of the effect of informal care-giving arrangement on mortality by controlling for the latter variable.

We added institutional care into the multivariable analyses as one of the control variables (Model II and Model IV), because the effect of informal care-giving arrangement could theoretically persist even after the care recipient became institutionalized. For example, there is a potential latency/induction period between receipt of care and mortality, which may be months to several years. As an extra analysis complying with another interpretation that there is no latency/induction period, we dealt with the care recipients who were institutionalized as censored at the moment of being institutionalized in addition to the care recipients who were moved out from the municipality. The adjusted HR of mortality among those receiving daughter-in-law care was 3.31 (95% CI 0.61-18.04), and 1.68 (95% CI 0.24-11.55) for those cared by the biological daughter. In other words, our findings were similar to the HRs in Table 3 (Model IV without control for institutional care).

The other possible limitations need to be noted when interpreting the results of our study. Our study is not nationally representative, and hence our findings may not be wholly generalizable to Japanese society. There is also the possibility of selection bias because of the

response rate to the baseline questionnaire. At baseline, however, regarding the response rate on informal care-giving arrangement (overall response rate; 54.9%, 191/348), there were no major differences by gender (response rate; male: 51.2% and female: 56.8%) or care needs level (response rate; assistance required: 50.0%, care needs level 1-2: 55.0% and care needs level 3-5: 47.6%).

Some observers have linked the ongoing decline in marital fertility in Japanese society to the evolving care-giving crisis in that same country [6,33]. During the past two decades, in tandem with the increased aging population, there has been a steady rise in the age at marriage for Japanese women and men, accompanied by an attendant collapse in the fertility rate, which is among the lowest in the world: 1.37 (total fertility rate in 2008) [34]. These trends have been reflected by a popular saying on the streets of Japan, which advises young women to choose their husbands carefully - preferably, sons whose parents have already passed away!

Conclusion

In summary, our study suggests a survival "penalty" for older women cared for by daughters-in-law. Our findings require replication in additional studies, as well as further research to elucidate the underlying mechanisms. If our findings are corroborated, there are two major implications. First, it would suggest that the longevity of Japanese women (currently the highest in the world) is unlikely to be explained by the traditional arrangement of inter-generational care-giving, mainly had been performed by daughter-in-law, toward the end of life. Second, our findings suggest that reliance upon traditional, informal care-giving arrangements may not be the optimal solution to dealing with the aging of Japanese society, and that policy approaches are needed to support the care-giving needs of a rapidly aging population.

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Authors' contributions

AN carried out structuring the study design, statistical analysis, interpreting the data, and drafting the manuscript. NT supervised all the process as the corresponding author: participated in the design of the study, statistical analysis, interpretation of the data, and helped to finalize the manuscript. MK participated in designing this study, acquiring the data, and structuring the data set. HT helped to create the SAS program to perform the statistical analysis and supervised statistical process. MS carried out special advice to structure the data set. IK participated in interpretation of the data and

helped to finalize the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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ORIGINAL ARTICLE: EPIDEMIOLOGY, CLINICAL
PRACTICE AND HEALTH

Comparison of public and private care management agencies under public long-term care insurance in Japan: A cross-sectional study

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Aim: Long-Term Care Insurance (LTCI), which started in April 2000, allowed private business corporations to provide long-term care services which had been provided by social welfare corporations or public agencies in the previous long-term care scheme. This study compared differences in care management plans for community-dwelling frail elderly people between public care management agencies and private care management agencies.

Methods: The subjects were 309 community-dwelling frail elderly people living in a suburban city with a population of approximately 55 000 and who had been using community-based long-term care services of the LTCI for 6 months from April 2000. The characteristics of the care management agencies (public/private) were identified using a claims database. After comparing profiles of users and their care mix between those managed by public agencies and by private agencies, the effect of the characteristics of care management agencies on LTCI service use was examined.

Results: Public care management agencies favored younger subjects ($P = 0.003$), male subjects ($P = 0.006$) and people with a higher need for care ($P = 0.02$) than private agencies. The number of service items used was significantly larger in public agencies than in their private counterparts. In multivariate regression analysis, the utilization of community-based long-term care service was significantly greater among beneficiaries managed by private agencies than those managed by public agencies ($P = 0.02$).

Conclusion: Private care management agencies play an important role in promoting the use of care services, but their quality of care plans might be questionable. **Geriatr Gerontol Int 2010; 10: 48–55.**

Keywords: care management agency, Long-Term Care Insurance, private, public.

Introduction

Long-Term Care Insurance (LTCI) was introduced in April 2000 in response to the rapidly aging Japanese

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population (the proportion of elderly people aged 65 years or over increased from 17.4% in 2000 to 19% in 2003) and to the corresponding rising need for long-term care (LTC). In Japan, because of rapid aging of the population, elder care had become a top policy issue by the 1990s. After a series of national initiatives to enhance LTC infrastructure, the Japanese government implemented LTCI in 2000, under the slogan “from care by family to care by society”, to make institutional and community-based LTC services a universal entitlement for the disabled elderly. The new LTCI is a radical

change for Japan, from traditional family-based care toward the socialization of care of the elderly. The primary purpose of this new system was to shift from conventional “family care” of the elderly to “social care” by community organizations. A major change in the Japanese welfare policy was the change from the “placement system” in the Welfare Law for the Elderly to a “contract system” in the new LTCI.^{1,2} The very core of the “placement system” was that the local government had the discretionary power to decide who should be admitted to which residential home and to deny service users the right to choose the type or provider of services.

By contrast, in the contract system, users in need of a service can contract with any LTC agency, freely choosing a care mix of health, medical and welfare services from various providers. Moreover, private business corporations are newly allowed to enter the LTC market in addition to social welfare corporations or public agencies in the old system. This inclusion marks a turning point in the Japanese welfare policy in which welfare services entered into free competition.^{1,2}

There is an urgent need to investigate the effect of this major change to help the LTC market mature in welfare policy. Although several studies³⁻⁶ have examined LTC service use in Japan, the effect of private care management agencies that participate in the LTC market has not been investigated.

In the USA, several comparative studies have examined types of service providers.^{7,8} In these studies, the frequency of visits was lowest for public agencies and highest for private agencies with the highest cost. The studies compared four types of agencies: public agencies (including the Visiting Nurse Association), non-profit organizations, foundations and a hospital agency. Although other studies of in-home LTC programs have been reported,⁹⁻¹⁸ few studies have compared various types of LTC agencies.

In the Japanese LTCI system, assessment of the user’s condition and arranging appropriate services (care plan) by a care manager are necessary in advance to using LTCI services, except for those cases who choose to make these arrangements by themselves without a care manager (actually, this is a negligible proportion), and the fee is fully covered without payment. Therefore, care management should have a great effect on total service use patterns. Care managers are specialists with various backgrounds, are licensed after nationally standardized examinations and training courses, and belong to either public or private agencies. Most of these agencies also provide their own services, not only care management, such as home-helpers, visiting nurses and daycare rehabilitation; however, private agencies might prioritize their own benefit in care management. Therefore, we analyzed differences among various types of care-management agencies as a way to investigate the effects

of the new welfare policy that allows private agencies to enter the market. Further, we suggested the future direction of public and private agencies.

Methods

Subjects

The subjects of this study were based on LTC bills of all users over the 6 months following the start of the LTCI in April 2000 in City A. The city is located approximately 100 km west of Tokyo, had a population of 55 000, and 16.3% of its proportion was elderly (aged ≥ 65 years) on 1 April 2000. This proportion was similar to the national average for Japan (17.2%).¹⁹ As of April 2000, the city had 543 users of LTCI home-care services, that is, not in institutional settings. During the 6 months studied, the number of users of LTCI home-care services increased to 660. Of these, we analyzed 309 users who continuously used in-home LTC services under the same care-management agencies and whose care level (national standard for care needs was determined by assessing the applicants’ physical and mental status: care levels 0–5, ranging from the lowest to the highest care needs level), remained unchanged throughout the 6-month period.

Analyzed data

From the LTC bills of City A, we obtained the following data: care level, age, sex, income class based on national criteria, type of care-management agency, living district, old-age pension, total service use, amount of LTCI benefits received, amount of co-payment, utilization of in-home LTC services, frequency of service use and total services used.

Ethical consideration

City A approved our use of the data after we submitted a formal application for accessing data, explaining the purpose and contents to be used. We also pledged to take maximum care in handling the data and to treat all data anonymously and in random order to prevent personal information from being revealed in the course of our study.

Ethics approval was gained from the University of Tsukuba Ethical Committee in Japan.

Classification of agencies

The care-management agencies belonged to various service-providing bodies as follows: social welfare corporation (except social welfare council: organ for conference and consultation), social welfare council, and medical corporations, charitable corporations,

including foundations, business corporations, non-profit corporations, agricultural cooperatives, cooperative societies, local public entities or others. For our study, we reorganized these agencies into four categories, according to previous US studies comparing different types of care-providing agencies:^{5,6} public sector, private sector, medical sector or others. We categorized care-management agencies of the public social welfare council and the municipal government as the public sector; and agencies of the social welfare corporation (except the public social welfare council) and business corporations as the private sector. The social welfare corporations were initially supervised by the local government, but are economically managed independently at present. This ground is specified in the Social Welfare Law article 24 (Shakaifukushi hou 24jou) established in 2000. These articles are as follows. The social welfare corporate body as a suitable business entity, properly effective as the main bearer of social welfare business, strengthening the management foundation is assured independently, ensuring the improvement of quality of the welfare service offered with the guarantee of transparent business management. In particular, since the legislation of the Social Welfare Law (former Social Welfare Services Law) in 2000, its role in controlling the operation of welfare organizations is becoming less important, as seen in a shift “from measures to contract”, entry of private companies and relaxation of regulations. In 2004, a meeting was held at the Welfare Committee of the Social Security Council to review the social welfare corporation system and further promote flexible operations, including sweeping deregulation of the use of funds and profit-making businesses. For these reasons, a social welfare organization is categorized as a private agency in this study. But the social welfare council – an organ for conference and consultation (Syakai-fukushi Kyogikai) – is categorized as a public agency.

Agencies of medical corporations, charitable corporations, and others providing mainly only medical services, were excluded because they are basically non-profit but varied in their actual activities and could not be categorized as either public or private. There were 154, 121 and 34 users in the public, private and medical sectors, respectively. For the purpose of this study, we focused on comparing agencies within the public and private sectors, and excluded the medical sector in this comparison.

Data analysis

After calculating data on the characteristics and service use of the 309 subjects, we described the public, private and medical (including others) sectors in terms of age, sex, care level, income, living district, total service use, amount of LTCI benefit, amount of co-payment, utili-

zation rate (proportion of paid benefit vs the limits defined by care level), the number of service items, in-home LTC services (used or not) and status of service use. Income was classified into two levels as either taxable or non-taxable. To identify any significant difference between public and private agencies, we used the χ^2 -test, Student's *t*-test and Wilcoxon signed-rank test by the data characteristics.

To observe the independent effect of the type of care-management agency to total service use amount, we performed multiple regression analysis. We selected total service use as a dependent variable, and age, sex, income, care level, medical service use and type of agency as independent variables that could potentially affect LTC service use. We also checked multicollinearity of the explanatory variables in order to examine the effects of multicollinearity.

Results

Characteristics of the subjects

Table 1 summarizes the basic characteristics of the 309 subjects of this study. Their age averaged 79.6 years, ranging from 56–99. There were 198 female subjects (64%). The average care level of all subjects was 2.1 (assistance required = 0, eligible care level = 1–5). Care level 1 was the most frequent care level, with 83 subjects (26.9%); care level 2 was second with 68 subjects (22%). Approximately 70% of the subjects had taxable income, and 28.5% were non-taxable. The average “total services used” during 6 months was 46 750 points (¥467 500 total, ¥77 917/month; \$US 1 = ¥110) per subject. The average utilization rate (proportion of paid benefit vs limits defined by each care level) was 38.7%.

Characteristics of each type of agency and results of the comparison

Subjects from each type of agency were compared in terms of age, sex, care level, income, status of in-home LTC service use, total service used, amount of LTCI benefit received, utilization rate and number of used service items (Tables 2,3).

Users of public agencies were significantly younger than those of private agencies, averaging 77.8 versus 82.1 years ($P = 0.003$, χ^2 -test). The proportion of male subjects was 42.2% in public agencies and 26.4% in private agencies ($P = 0.006$). The average care level was 2.2 for public agencies and 1.8 for private agencies ($P = 0.02$) (Table 3, all data for each level are shown). For income, the difference was not significant.

Utilization rates were 34.4% in public agencies and 41.7% in private agencies ($P = 0.002$). The number of service items averaged 2.2 for public agencies, significantly higher than 1.9 for private agencies ($P = 0.027$) (Table 3). There was no significant difference between

Table 1 Basic characteristics of the subjects and utilization of community-based Long-Term Care Insurance services

(<i>n</i> = 309)	<i>n</i>	%	Mean	Min.	Max.	Utilization rate [†]
Basic characteristics						
Age	309		79.6	56	99	
Sex						
Male	111	35.9				
Female	198	64.1				
Care level [‡]	309		2.1	0	5	
Assistance required	46	14.9				57.1
Level 1	83	26.9				33.3
Level 2	68	22.0				33.2
Level 3	46	14.9				30.0
Level 4	31	10.0				41.2
Level 5	35	11.3				47.0
Service utilization						
Total service use (¥)	309		5E+05	14 600	2 249 600	
Utilization rate [†]	309		38.7	1	107	

[†]Utilization rate is the proportion of the service use vs the limits defined by care level (\$US 1 = ¥110). [‡]Care levels are determined by assessing the applicants' physical and mental status. Assistance required represents the lowest need of care and level 5 represents the highest need of care.

Table 2 Comparison of characteristics of beneficiaries managed by public and private agencies

	Care management agencies		Statistic [§]	<i>P</i> -value
	Public [†] (<i>n</i> = 154) <i>n</i> (%)	Private [‡] (<i>n</i> = 121) <i>n</i> (%)		
Age, years			<i>Z</i> = 3.92	0.0001
Mean (SD)	77.8 (9.3)	82.1 (8.1)		
Sex			7.37	0.006
Male	65 (42.2)	32 (26.4)		
Female	89 (57.8)	89 (73.6)		
Care level [¶]			13.1	0.02
Assistance required	18 (11.7)	25 (20.7)		
Level 1	44 (28.6)	33 (27.3)		
Level 2	33 (21.4)	29 (24.0)		
Level 3	25 (16.2)	13 (10.7)		
Level 4	13 (8.4)	16 (13.2)		
Level 5	21 (13.6)	5 (4.1)		
Income			2.68	0.26
Taxable	109 (70.8)	84 (69.4)		
Non-	44 (28.6)	33 (27.3)		
Else	1 (0.6)	4 (3.3)		

[†]Public agencies are the social welfare council and municipal government. [‡]Private agencies are social welfare corporations (except the social welfare council) and business corporations. [§]Statistic is χ^2 -test unless otherwise indicated. [¶]Care levels are determined by assessing each applicant's physical and mental status. Assistance required (disability is lower than level 1, only preventive service is eligible, calculated as 0 in the average calculation shown in the text); the other five levels range from the lowest (care level 1) to the most severe (care level 5) needs. SD, standard deviation.

Table 3 Comparison of service utilization between beneficiaries managed by public and private agencies

	Care management agencies				Z score	P-value
	Public [†] (n = 154)		Private [‡] (n = 121)			
	Mean	SD	Mean	SD		
Total service use, yen [§]	439 600	340 160	435 670	302 290	0.38	0.349
Utilization rate, % [¶]	34.4	19.3	41.7	21.9	2.86	0.002
Number of service	2.2	1.3	1.9	1.1	1.91	0.027

[†]Public agencies are the social welfare council and municipal government. [‡]Private agencies are social welfare corporations (except the social welfare council) and business corporations. [§]Six-month average of utilization of community-based long-term care services in total (\$US 1 = ¥110). [¶]The utilization rate is the proportion of the service use vs the limits defined by care level. SD, standard deviation.

Table 4 Utilization of community-based long-term care (LTC) services by characteristics of care management agencies

Number (%) of users of LTC service	Care management agencies		χ^2	P-value
	Public [†] n (%)	Private [‡] n (%)		
Welfare services				
Home help	43 (28)	42 (35)	1.46	0.226
Home bath service	22 (14)	6 (5)	6.44	0.01
Day service	105 (68)	84 (69)	0.05	0.8
Loan of devices	69 (45)	34 (28)	8.07	0.004
Nursing-home respite service	27 (18)	24 (20)	0.23	0.62
Purchase of devices	4 (3)	4 (3)	0.12	0.72
Housing improvement	8 (5)	2 (2)	2.42	0.12
Total use of welfare services	151 (98)	114 (94)	2.85	0.09
Medical services				
Visiting nurse	26 (17)	11 (9)	3.53	0.06
Home rehabilitation	0 (0)	0 (0)		NA
Day care	25 (16)	20 (17)	0.004	0.9
Health respite service	13 (8)	7 (6)	0.7	0.399
Short stay (hospital)	1 (1)	0 (0)		NA
Medical management by physician	11 (7)	4 (3)	1.93	0.16
Total use of Medical service [§]	61 (40)	33 (27)	4.58	0.03

[†]Public agencies are the social welfare council and municipal government. [‡]Private agencies are social welfare corporations (except the social welfare council) and business corporations. [§]Medical services include visiting nurse, home rehabilitation, day care, health respite service, short stay (hospital), and medical management by a physician. NA, not applicable.

public agencies and private agencies for the other factors.

We compared each service provided by public and private agencies (Table 4). For in-home LTC services, public agencies surpassed private agencies significantly in the proportion of subjects who used home bath services ($P = 0.01$) and loaned welfare equipment ($P = 0.004$). Public agencies tended to use more visiting nurses ($P = 0.06$). Of the in-home LTC services, visiting

nurses, home rehabilitation, daycare and management guidance for in-home care were categorized as medical services, while the other in-home LTC services were categorized as welfare services. Moreover, 39.6% of the subjects in public agencies and 27.2% of subjects in private agencies used medical services; again, the difference was significant ($P = 0.03$). There was no significant difference in welfare service or total service used between public and private agencies.

Effects of agencies' characteristics on total service use

The results of multiple regression analysis are shown in Table 5. We found that care management agencies (private agencies), a high care level and medical service use affected total service use ($P < 0.02$, $P < 0.001$). The characteristics of the agencies (private agencies) positively affected LTC service use, even after adjusting for these other factors. The correlation coefficient between the explanatory variables was less than 0.5, the effects of multicollinearity was not to be considered.

Discussion

Comparing public and private agencies

This study revealed that the users of private agencies were significantly older, including more women, and with a lower care level than users of public agencies. Generally, men have a shorter healthy life expectancy than women (average life expectancy minus disabled life expectancy),²⁰ and men have a greater likelihood of becoming disabled and requiring LTC than women at a relatively younger age. Consequently, private agencies treated more people with relatively low LTC needs than did public agencies.

In the comparison of service use between the two types of agencies, in-home medical service was used significantly more in public agencies, suggesting that the need for medical care was greater in public agencies. However, the utilization rate was higher in private agencies that used significantly fewer medical services because they used more non-medical services. Medical services were used more frequently in public agencies in the higher care levels and naturally might have more medical care needs compared to those of private agencies who need mainly welfare services. In Table 2, the average care level of public agencies was significantly higher than those of private agencies; concretely, care level 3 was 25 for public agencies and 13 for private

agencies, and care level 5 was 21 versus five. To identify the reason, we examined how each agency provided in-home LTC services as a service provider and found that private agencies only offered in-home LTC services, and not medical services (data not shown); therefore, private agencies tend to make care plans using their own welfare services.

Users of public agencies used significantly more service items than those of private agencies. In the LTCI fee revision of 2003, ¥1000 was added in the case of care plans that included four or more types of home-based care services, the system to pay more for the care plan with more various services than that with fewer items was settled. Though the system is canceled now, there might be some effect to avoid the inadequate care plan which includes only a little service for the profit of the agency offering that service rather than the actual users' needs based on the assessment. Why was there a difference in LTC service and utilization rate between the two types of agency? A possible reason may be considered that private agencies seek profit and they made efforts to encourage the service use more than public agencies. If these efforts resulted in matching to the users' needs not only for their profit, they may contribute to better quality of care, but we need further analysis including outcome assessment.

We question whether private agencies have appropriate care plans and use suitable LTC services regarding users' LTC requirements, and not only promotion of their own services.

The results of multiple regression analysis to demonstrate the dependent effect of the type of agency showed that the type of agency significantly affected the total services used. While Table 3 shows that the average total service use is slightly larger in public agencies, in which more medical services were used by people in need of a higher care level, no significant difference was demonstrated by a crude Student's *t*-test. However, the results of a multiple regression analysis, in which other factors were controlled, indicated that care services were

Table 5 Effects of care management agencies' characteristics on total service use (multiple regression analysis)

Explanatory variable	Standardized regression coefficient	<i>P</i> -value
Care management agencies [†]	0.11070	0.02
Age	-0.03229	0.52
Sex [‡]	-0.02382	0.63
Care level [§]	0.55011	<0.0001
Medical service [¶]	0.27996	<0.0001
Income ^{**}	0.00687	0.88

[†]Care managing agencies were public (0) and private (1) agencies. [‡]Sex was male (0), female (1). [§]Care level was 0-5. [¶]Medical service was not used (0), used (1). ^{**}Income was non-taxable (0), taxable (1).