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Clinic-level factors associated with collaboration with community pharmacies in Japan

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The aim of this study was to clarify the clinic-level factors related to experiences of and attitudes toward collaboration with community pharmacies. We conducted a postal questionnaire survey of all clinics in Gifu, Japan, assessing the experiences and attitudes of representative clinical staff regarding the following activities in collaboration with community pharmacists: regional care meetings/service adjustment meetings, case study conferences, joint workshops/continuing education conferences, community services, information sharing through medical cooperation networks, and accompanying community pharmacists during home care. The factors significantly related to experiences of joint workshops/continuing education conferences included home care visits (odds ratio [OR] 2.39) and a 100 % out-of-hospital prescription ratio (OR 4.80). In contrast, only home care visits were significantly associated with consideration of information sharing through medical cooperation networks and accompanying community pharmacists during home care (OR 2.06 and 11.91, respectively). Finally, the factors significantly associated with considering implementing case study conferences and joint workshops/continuing education conferences included home care visits (OR 4.64 and 2.98, respectively) and a 100% out-of-hospital prescription ratio (OR 4.64 and 6.38). Overall, having more opportunities to communicate with community pharmacists and other healthcare professionals appeared to facilitate clinics' consideration of collaboration with community pharmacies, along with actual experiences.

1. Introduction

Many studies have been conducted regarding interprofessional collaboration and numerous studies have demonstrated the effectiveness of interventions involving collaborative practice between physicians and pharmacists (Aguiar et al. 2016; Carter et al. 2008; Irons et al. 2002; Sisson et al. 2016)._ENREF_2 In 2008, Carter et al. conducted a cluster-randomized trial to evaluate physician–pharmacist collaboration to improve blood pressure control in the United States. They reported that such collaboration led to significantly better mean blood pressure by intensifying medication therapy and improving patient adherence. Additionally, a survey on the collaboration between physicians and pharmacists revealed that both parties reported a strong need for collaboration; however, their collaboration was often impeded by time shortages (Kelly et al. 2013). Several studies have examined community pharmacists' involvement in the continuing care of patients following hospital discharge (Cavrenne and Spinewine 2008; Nazar et al. 2016; Stafford et al. 2011). Nazar et al. (2016) examined the efficacy of an electronic patient referral system from hospitals to community pharmacies. Through this system, information about patient's medicine could be delivered to requisite pharmacies. The authors found that patients who participated in follow-up consultations with a community pharmacist had lower readmission rates and shorter hospital stays than did patients who did not participate on those consultations (Nazar et al. 2016). Sharing patient information such as past medical history, history of allergies, side effects, and medication lists between hospitals and community pharmacies could help ensure good medication therapy management.

Interprofessional team collaboration is also considered important in Japan. The Ministry of Health, Labour and Welfare launched the "Study Group on the Promotion of Interprofessional Teamwork" in 2009 to clarify the role of each healthcare professional within a team and how these professionals should collaborate within that team. Pharmacists, as team members, are expected to actively provide medication information and recommendations to other team members, as well as to participate in medication management during home care (Ministry of Health, Labour and Welfare 2010). Numerous research studies examining pharmacist interventions during home care have largely confirmed the necessity and effectiveness of pharmacist services in Japan (Onda et al. 2015; Takada et al. 2015; Hirotani et al. 2012).

In addition, in 2015 the Ministry of Health, Labour and Welfare announced the "Vision of Pharmacy for Patients," according to which "strengthening interprofessional collaboration with family physicians" was a major function of family pharmacies (Ministry of Health, Labour and Welfare, 2015). Patients in Japan are advised to have a family pharmacy to which they send all their prescriptions, which helps avoid duplication of medications or drug interactions, thereby making medication treatment safer. Family pharmacists are also advised to make medication recommendations to doctors as necessary, based on information obtained *via* patient interviews. They are responsible for consulting with patients 24 hours a day, and providing feedback to doctors using their pharmaceutical expertise when necessary. To smoothly perform these collaborative activities, family pharmacies are required to have a collaboration system with medical institutions. Collaboration between clinics and community pharmacies is indispensable, as it can ensure appropriate medication therapy for outpatients. However, there have been few reports on the factors related to collaboration between clinics and community pharmacies in Japan. Therefore, we conducted a postal questionnaire survey of clinics in Gifu, Japan. The aim of this study was to clarify the clinic-level factors related to the experiences of, and attitudes toward, collaboration with community pharmacies. This was intended to prepare healthcare professionals for collaboration with family pharmacies in order to support local residents.

2. Investigations and results

We conducted a postal questionnaire survey from October 1 to December 6, 2016. We mailed questionnaires to all clinics in Gifu City, Gifu Prefecture, Japan. We asked characteristics of the studied clinics included the type, medical specialty, medical facility (multiple answers allowed), number of physicians, number of nurses/associate nurses, number of pharmacists, number of other staff, number of outpatients, number of home care visits, and ratio of prescriptions filled out-of-hospital. The main outcomes were respondents' experiences of, and attitudes toward, the following activities in collaboration with community pharmacies: regional care meetings/service adjustment meetings, case discussion conferences, joint workshops/continuing education conferences, community service, information sharing through medical cooperation networks, and accompanying community pharmacists during home care. Of the 355 clinics invited to participate, 178 completed surveys; the response rate was 50.1% and the amount of valid responses was 99.4% (177/178). The descriptive statistics for the characteristics are shown in Table 1.

2.1. Factors related to the experiences of and attitudes toward collaboration with pharmacies (stratification analysis)

Tables 2A and 2B depict the factors associated with experiences of and attitudes toward collaboration with community pharmacies, respectively. The ratio of answering "more than one" for the number of home care visits was significantly greater in clinics that had experienced regional care meetings/service coordination meetings and that accompanied community pharmacists during home care compared to clinics that had not experienced these activities. A significantly greater proportion of clinics with experience of

Table 1: Results of the Characteristics of the Clinics

□	□	*n*	%	□	□	□	*n*	%
1. Type	Clinics without beds	155	87.6		6. Number of pharmacists	0	155	87.6
	Clinics with beds	22	12.4			More than 0, and 1 or less	19	10.7
					(Full-time conversion)	More than 1, and 2 or less	2	1.1
2. Medical specialty	Internal medicine	94	53.1			More than 2	1	0.6
(Multiple answers allowed)	Surgery	24	13.6			Unknown answer	0	0.0
	Orthopedics	27	15.3					
	Psychiatry	7	4.0		7. Number of other staff	0	2	1.1
	Pediatrics	50	28.2			More than 0, and 1 or less	4	2.3
	Dermatology	22	12.4		(Full-time conversion)	More than 1, and 2 or less	21	11.9
	Urology	6	3.4			More than 2, and 3 or less	47	26.6
	Obstetrics and gynecology	9	5.1			More than 3, and 4 or less	28	15.8
	Ophthalmology	16	9.0			More than 4	75	42.4
	Otolaryngology	12	6.8			Unknown answer	0	0.0
	Others	56	31.6					
					8. Number of outpatients	0	0	0.0
3. Facility	Medical care health care facility	2	1.1			1–500	41	23.2
(Multiple answers allowed)	Long-term care geriatric health facility	2	1.1		□(in Sep 2016)	501–1,000	64	36.2
	Long-term care old-welfare institution	1	0.6			1,001–1,500	31	17.5
	Light-paid nursing home	0	0.0			1,501–2,000	16	9.0
	Paid nursing home	1	0.6			≥2000	24	13.6
	House for geriatrics with service	2	1.1			Unknown answer	1	0.6
	Others	15	8.5					
					9. Number of home care visits	0	77	43.5
4. Number of physicians	One	119	67.2			1–10	58	32.8
	More than 1, and 2 or less	43	24.3		□(in Sep 2016)	11–30	22	12.4
(Full-time conversion)	More than 2, and 3 or less	12	6.8			31–50	6	3.4
	More than 3	3	1.7			51–100	8	4.5
	Unknown answer	0	0.0			≥101	6	3.4
						Unknown answer	0	0.0
5. Number of nurses/ associated nurses	0	18	10.2					
	More than 0, and 1 or less	17	9.6		10. Ratio of prescriptions filled out-of-hospital	0%	29	16.4
(Full-time conversion)	More than 1, and 2 or less	40	22.6			More than 0% and 20% or less	29	16.4
	More than 2, and 3 or less	45	25.4		□(in Sep 2016)	More than 20% and 50% or less	1	0.6
	More than 3, and 4 or less	25	14.1			More than 50% and 80% or less	3	1.7
	More than 4	31	17.5			More than 80% and less than 100%	20	11.3
	Unknown answer	1	0.6			100%	95	53.7
□	□	□	□	□	□	Unknown answer	0	0.0

Table 2A: Comparison of Characteristics According to Experience of Collaboration with Community Pharmacies

		I. Regional care meetings/Service coordination meetings			II. Case discussion conferences		
		Experienced	Not conducted	*p*	Experienced	Not conducted	*p*
1. Type	Clinics without beds	100% (16/16)	85.9% (134/156)	0.229	83.3% (15/18)	87.7% (135/154)	0.707
2. Number of physicians	2 or more	31.3% (5/16)	34.0% (53/156)	1.000	38.9% (7/18)	33.1% (51/154)	0.609
3. Number of nurses/associated nurses	3 or more	62.5% (10/16)	56.8% (88/155)	0.793	50.0% (9/18)	57.5% (88/153)	0.619
4. Number of pharmacists	0	87.5% (14/16)	88.5% (138/156)	1.000	88.9% (16/18)	88.3% (136/154)	1.000
5. Number of other staff	4 or less	62.5% (10/16)	55.8% (87/156)	0.792	66.7% (12/18)	55.8% (86/154)	0.456
6. Number of outpatients	1001-	56.3% (9/16)	39.1% (61/156)	0.194	44.4% (8/18)	39.6% (61/154)	0.801
7. Number of home care visits	1 or more	100% (16/16)	51.9% (81/156)	<0.001*	77.8% (14/18)	54.5% (84/154)	0.078
8. Ratio of prescriptions filled out-of-hospital	100%	62.5% (10/16)	52.6% (82/156)	0.600	66.7% (12/18)	51.3% (79/154)	0.318

		III. Joint workshops/continuing education conferences			IV. Community service		
		Experienced	Not conducted	*p*	Experienced	Not conducted	*p*
1. Type	Clinics without beds	90.9% (50/55)	85.8% (103/120)	0.464	92.3% (12/13)	87.0% (140/161)	1.000
2. Number of physicians	2 or more	36.4% (20/55)	31.7% (38/120)	0.605	53.8% (7/13)	31.7% (51/161)	0.128
3. Number of nurses/associated nurses	3 or more	65.5% (36/55)	52.9% (63/119)	0.140	61.5% (8/13)	56.9% (91/160)	1.000
4. Number of pharmacists	0	92.7% (51/55)	85.8% (103/120)	0.221	100% (13/13)	87.6% (141/161)	0.367
5. Number of other staff	4 or less	56.4% (31/55)	57.5% (69/120)	1.000	53.8% (7/13)	57.1% (92/161)	1.000
6. Number of outpatients	1001-	50.9% (28/55)	35.0% (42/120)	0.067	46.2% (6/13)	39.8% (64/161)	0.771
7. Number of home care visits	1 or more	67.3% (37/55)	51.7% (62/120)	0.070	76.9% (10/13)	54.7% (88/161)	0.152
8. Ratio of prescriptions filled out-of-hospital	100%	78.2% (43/55)	42.5% (51/120)	<0.001*	53.8% (7/13)	53.4% (86/161)	1.000

		V. Sharing information through medical cooperation networks			VI. Accompanying community pharmacists during home care		
		Experienced	Not conducted	*p*	Experienced	Not conducted	*p*
1. Type	Clinics without beds	85.0% (17/20)	87.4% (132/151)	0.726	93.3% (14/15)	86.8% (138/159)	0.697
2. Number of physicians	2 or more	50.0% (10/20)	31.8% (48/151)	0.132	26.7% (4/15)	34.0% (54/159)	0.776
3. Number of nurses/associated nurses	3 or more	40.0% (8/20)	59.3% (89/150)	0.148	46.7% (7/15)	57.6% (91/158)	0.428
4. Number of pharmacists	0	95.0% (19/20)	87.4% (132/151)	0.474	86.7% (13/15)	88.1% (140/159)	1.000
5. Number of other staff	4 or less	65.0% (13/20)	55.0% (83/151)	0.476	66.7% (10/15)	56.0% (89/159)	0.587
6. Number of outpatients	1001-	25.0% (5/20)	42.4% (64/151)	0.154	40.3% (6/15)	40.3% (64/159)	1.000
7. Number of home care visits	1 or more	75.0% (15/20)	53.6% (81/151)	0.093	100% (15/15)	52.8% (84/159)	<0.001*
8. Ratio of prescriptions filled out-of-hospital	100%	55.0% (11/20)	53.0% (80/151)	1.000	66.7% (10/15)	52.2% (83/159)	0.418

*$p < .05$ Fisher's exact test

joint workshops/continuing education conferences reported 100% out-of-hospital prescription ratios. We observed no significant differences among the clinics that participated in case discussion conferences, community service, or information sharing through medical cooperation networks.

As for attitudes toward collaboration, clinics that considered collaborating in regional care meetings/service coordination meetings, information sharing through medical cooperation networks, and accompanying community pharmacists during home care more commonly reported "more than one" home care visits. Furthermore, clinics that considered collaborating in case discussion conferences and joint workshops/continuing education conferences (vs. not collaborating) had higher ratios of reporting "more than one" home care visits and a 100% out-of-hospital prescription ratio. Clinics that considered collaborating in community service had a higher ratio of reporting "two or more" physicians.

Table 3A shows the results of the factors associated with overall experiences of collaboration with community pharmacies. Clinics that had implemented collaborations had a significantly higher percentage of reporting "more than one" home care visits and a 100% out-of-hospital prescription ratio. Table 3B shows the results for the factors related to attitude. The clinics that considered collaboration had a significantly higher ratio of reporting "three or more" nurses/associated nurses, "one or more" home care visits, and a 100% out-of-hospital prescription ratio.

Table 2B: Comparison of Characteristics According to Intention to Collaborate with Community Pharmacists

		I. Regional care meetings/Service coordination meetings				II. Case discussion conferences		
		Considering implementation	Not considering implementation	*P*		Considering implementation	Not considering implementation	*P*
1. Type	Clinics without beds	90.2% (37/41)	86.2% (109/127)	0.599		88.7% (55/62)	86.2% (94/109)	0.813
2. Number of physicians	2 or more	41.5% (17/41)	30.7% (39/127)	0.253		35.5% (22/62)	33.0% (36/109)	0.740
3. Number of nurses/associated nurses	3 or more	60.0% (24/40)	55.1% 70/127)	0.715		65.6% (40/61)	51.4% (56/109)	0.079
4. Number of pharmacists	0	85.4% (35/41)	90.6% (115/127)	0.386		88.7% (55/62)	89.0% (97/109)	1.000
5. Number of other staff	4 or less	56.1% (23/41)	55.1% (70/127)	1.000		56.5% (35/62)	56.9% (62/109)	1.000
6. Number of outpatients	≥1001	46.3% (19/41)	38.6% (49/127)	0.465		48.4% (30/62)	35.8% (39/109)	0.144
7. Number of home care visits	1 or more	80.5% (33/41)	48.0% (61/127)	<0.001*		75.8.% (47/62)	45.9% (50/109)	<0.001*
8. Ratio of prescriptions filled out-of-hospital	100%	61.0% (25/41)	50.4% (64/127)	0.282		72.6% (45/62)	41.3% (45/109)	<0.001*

		III. Joint workshops/continuing education conferences				IV. Community service		
		Considering implementation	Not considering implementation	*P*		Considering implementation	Not considering implementation	*P*
1. Type	Clinics without beds	87.8% (79/90)	86.9% (73/84)	1.000		83.8% (31/37)	87.9% (116/132)	0.581
2. Number of physicians	2 or more	32.2% (29/90)	33.3% (28/84)	1.000		51.4% (19/37)	28.8% (38/132)	0.017*
3. Number of nurses/associated nurses	3 or more	64.0% (57/89)	48.8% (41/84)	0.047*		66.7% (24/36)	53.8% (71/132)	0.188
4. Number of pharmacists	0	87.8% (79/90)	89.3% (75/84)	0.815		91.9% (34/37)	89.4% (118/132)	1.000
5. Number of other staff	4 or less	55.6% (50/90)	58.3% (49/84)	0.760		54.1% (20/37)	56.8% (75/132)	0.852
6. Number of outpatients	≥1001	45.6% (41/90)	34.5% (29/84)	0.165		54.1% (20/37)	37.1% (49/132)	0.088
7. Number of home care visits	1 or more	66.7% (60/90)	45.2% (38/84)	0.006*		64.9% (24/37)	53.0% (70/132)	0.261
8. Ratio of prescriptions filled out-of-hospital	100%	73.3% (66/90)	33.3% (28/84)	<0.001*		62.2% (23/37)	50.8% (67/132)	0.265

		V. Sharing information through medical cooperation networks				VI. Accompanying community pharmacists during home care		
		Considering implementation	Not considering implementation	*P*		Considering implementation	Not considering implementation	*P*
1. Type	Clinics without beds	87.3% (62/71)	87.1% (88/101)	1.000		88.9% (32/36)	86.6% (116/134)	1.000
2. Number of physicians	2 or more	35.2% (25/71)	32.7% (33/101)	0.746		27.8% (10/36)	34.3% (46/134)	0.551
3. Number of nurses/associated nurses	3 or more	54.3% (38/70)	58.4% (59/101)	0.639		51.4% (18/35)	56.7% (76/134)	0.703
4. Number of pharmacists	0	88.7% (63/71)	88.1% (89/101)	1.000		80.6% (29/36)	90.3% (121/134)	0.142
5. Number of other staff	4 or less	59.2% (42/71)	54.5% (55/101)	0.640		61.1% (22/36)	56.0% (75/134)	0.705
6. Number of outpatients	≥1001	39.4% (28/71)	40.6% (41/101)	1.000		38.9% (14/36)	39.6% (53/134)	1.000
7. Number of home care visits	1 or more	66.2% (47/71)	49.5% (50/101)	0.042*		91.7% (33/36)	47.8% (64/134)	<0.001*
8. Ratio of prescriptions filled out-of-hospital	100%	60.6% (43/71)	47.5% (48/101)	0.121		61.1% (22/36)	50.7% (68/134)	0.347

*P < 0.05 Fisher's exact test

2.2. Multivariate analysis

Tables 4A and 4B present the results of the multiple logistic regression analysis. Regarding the experience of joint workshops/continuing education conferences, participants who reported "one or more" home care visits had greater odds of experiencing such workshops or conferences compared to those who answered "zero" (odds ratio [OR] 2.39, 95% confidence interval [CI] [1.12, 5.12]). A similar trend was observed in participants who reported a 100% out-of-hospital prescription ratio (OR 4.80, 95% CI [2.23, 10.30]).

Participants who reported "one or more" home care visits and a 100% out-of-hospital prescription ratio had greater odds of considering collaboration in the case study conferences (OR 4.64, 95% CI [2.10, 10.28] and OR 4.64, 95% CI [2.20, 9.78], respectively) and joint workshops/continuous education conferences (OR 2.98, 95% CI [1.44, 6.15] and OR 6.38, 95% CI [3.16, 12.87], respectively). Furthermore, participants who reported "two or more" physicians had greater odds of considering collaboration in community service compared to those who answered "one or less" (OR 2.18, 95% CI [1.00, 4.75]). On the other hand, participants who had "one or more" home care visits had greater odds of considering collaboration in information sharing through medical cooperation networks (OR 2.06, 95% CI [1.09, 3.89]) and accompanying community pharmacists during home care (OR 11.91, 95% CI [3.47, 40.87]).

Drawing on the data from Table 3A, a Poisson regression analysis was performed with the factors that had a significance level of a $p < .25$ as the independent variables and the number of experience/attitude items (Tables 6A and 6B, respectively). As shown in Table

Table 3: Results of the Stratification Analysis

A. Experiences of collaboration

□	□	Experienced	Not conducted	*p*
1. Type	Clinics without beds	90.4% (75/83)	84.6% (77/91)	0.361
2. Number of physicians	2 or more	31.3% (26/83)	35.2% (32/91)	0.631
3. Number of nurses/associated nurses	3 or more	63.9% (53/83)	51.1% (46/90)	0.094
4. Number of pharmacists	0	92.8% (77/83)	83.5% (76/91)	0.067
5. Number of other staff	4 or fewer	62.7% (52/83)	51.6% (47/91)	0.169
6. Number of outpatients	1001 or more	45.8% (38/83)	35.2% (32/91)	0.167
7. Number of home care visits	1 or more	71.1% (59/83)	42.9% (39/91)	<0.001*
8. Ratio of prescriptions that were filled out-of-hospital	100%	72.3% (60/83)	37.4% (34/91)	<0.001*

B. Attitudes toward collaboration

□	□	Considering implementation	Not considering implementation	*p*
1. Type	Clinics without beds	87.2% (95/109)	87.7% (57/65)	1.000
2. Number of physicians	2 or more	30.3% (33/109)	36.9% (24/65)	0.406
3. Number of nurses/associated nurses	3 or more	63.0% (68/108)	46.2% (30/65)	0.039*
4. Number of pharmacists	0	89.0% (97/109)	87.7% (57/65)	0.810
5. Number of other staff	4 or fewer	59.6% (65/109)	52.3% (64/65)	0.429
6. Number of outpatients	1001 or more	43.1% (47/109)	35.4% (23/65)	0.341
7. Number of home care visits	1 or more	67.9% (74/109)	36.9% (24/65)	<0.001*
8. Ratio of prescriptions that were filled out-of-hospital	100%	66.1% (72/109)	33.8% (22/65)	<0.001*

Note. *$p < .05$ Fisher's exact test
Collaboration was considered to have been present when at least one item was implemented/intended to be implemented.

5A, significant differences were observed in the number of outpatients (more than 1,000; $p = .049$), number of home care visits (one or more; $p < 0.001$), and out-of-hospital prescription ratio (100%; $p = .005$). On the other hand, as noted in Table 5B, significant differences were observed in the number of home care visits (one or more; $p < 0.001$) and out-of-hospital prescription ratio (100%; $p < 0.001$).

3. Discussion

In this study, we clarified the factors related to clinics' experiences of and attitudes toward collaboration with community pharmacies. Clinics that provided home medical care had more experience of implementing regional care meetings/service coordination meetings and accompanying community pharmacists during home care. Similarly, clinics that provided home care also considered participating in regional care meetings/service coordination meetings.

The multiple logistic regression analysis indicated that the clinics that provided home care and had a 100% out-of-hospital prescription ratio had a higher odds of implementing joint workshops/continuing education conferences with community pharmacists. Similarly, clinics that provided home care had a higher odds of considering the implementation of case discussion conferences, joint workshops/continuing education conferences, information sharing through medical cooperation networks, and accompanying community pharmacists during home care. These results accord with a past study indicating that general practitioners who conduct home care have a greater awareness of home-visiting services offered by pharmacists and recognize those services as necessary (Onda et al. 2002). However, we should note that nearly half of the clinics we surveyed did not provide home care. To promote collaboration between clinics and community pharmacies, it is important to increase the number of home care visits and individuals' understanding of the importance and usefulness of pharmacists' services. The Ministry of Health, Labour and Welfare in Japan (2017) has been making progress in this regard, publishing a paper called "Good examples of pharmacies/pharmacists participating in regional comprehensive care system." This paper showed that pharmacists could help solve medication-related problems by attending regional care meetings or case discussion conferences. These activities also improved other health care professionals' understanding of the role of pharmacists (Ministry of Health, Labour and Welfare 2017). Therefore, community pharmacists should actively provide patient information to other healthcare professionals and make recommendations on medications, as well as help physicians realize that collaboration with pharmacists can only benefit the quality of medication management.

Clinics that reported a 100% out-of-hospital prescription ratio had greater odds of considering collaboration in case discussion conferences and joint workshops/continuing education conferences. In such clinics, physicians might have had more opportunities to communicate with community pharmacists because of inquiries made by the pharmacists themselves (which could contribute to greater overall understanding among physicians of the importance and usefulness of pharmacists' services). In addition, clinics with two or more physicians gave greater consideration to offering community services. This is perhaps because offering community services requires considerable time and a relatively large workforce to prepare; thus, a clinic with more physicians is better equipped to considering implementation of such services.

The Poisson regression analysis revealed that clinics with more than 1,000 outpatients, that conducted home care, and provided only out-of-hospital prescriptions collaborated on more of the six items that we studied. Similarly, clinics that were conducting home care and providing only out-of-hospital prescriptions considered performing more forms of collaboration in the future. Similar results were obtained in the multiple logistic and Poisson regression analyses; however, the latter suggested that these factors might be stable factors affecting the further development of interprofessional collaboration.

Based on these results, the clinics in our studies created more opportunities to interact with community pharmacists, imple-

Table 4: Results of the Multiple Logistic Regression Analysis

A. Experiences of collaboration with community pharmacies		
□	OR [95% CI]	*p*
Joint workshops/continuing education conferences		
3. Number of nurses/associated nurses (3 or more)	1.12 [0.53, 2.39]	0.763
4. Number of pharmacists (0)	2.04 [0.57, 7.26]	0.271
6. Number of outpatients (≥1001)	1.90 [0.92, 3.92]	0.083
7. Number of home care visits (1or more)	2.39 [1.12, 5.12]	0.025*
8. The ratio of prescriptions filled out-of-hospital (100%)	4.80 [2.23, 10.30]	<0.001*
Community service		
2. Number of physicians (2 or more)	2.32 [0.73, 7.32]	0.153
7. Number of home care visits (1 or more)	2.55 [0.67, 9.70]	0.170
Sharing information through medical cooperation networks		
2. Number of physicians (2 or more)	2.52 [0.91, 7.01]	0.076
3. Number of nurses/associated nurses (3 or more)	0.40 [0.14, 1.11]	0.079
6. Number of outpatients (≥1001)	0.46 [0.14, 1.46]	0.186
7. Number of home care visits (1 or more)	2.84 [0.92, 8.73]	0.069
B. Consideration of collaborating with community pharmacies		
□	OR [95% CI]	*p*
Case discussion conferences		
3. Number of nurses/associated nurses (3 or more)	1.02 [0.48, 2.18]	0.962
6. Number of outpatients (≥1001)	0.55 [0.26, 1.15]	0.114
7. Number of home care visits (1 or more)	4.64 [2.10, 10.28]	<0.001*
8. Ratio of prescriptions that were filled out-of-hospital (100%)	4.64 [2.20, 9.78]	<0.001*
Joint workshops/continuing education conferences		
3. Number of nurses/associated nurses (3 or more)	1.24 [0.60, 2.54]	0.562
6. Number of outpatients (≥1001)	0.66 [0.32, 1.34]	0.249
7. Number of home care visits (1 or more)	2.98 [1.44, 6.15]	0.003*
8. Ratio of prescriptions that were filled out-of-hospital (100%)	6.38 [3.16, 12.87]	<0.001*
Community service		
2. Number of physicians (2 or more)	2.18 [1.00, 4.75]	0.049*
3. Number of nurses/associated nurses (3 or more)	0.67 [0.30, 1.51]	0.339
6. Number of outpatients (≥1001)	0.61 [0.28, 1.34]	0.218
Sharing information through medical cooperation networks		
7. Number of home care visits (1 or more)	2.06 [1.09, 3.89]	0.026*
8. Ratio of prescriptions that were filled out-of-hospital (100%)	1.76 [0.94, 3.30]	0.076
Accompanying community pharmacists during home care		
4. Number of pharmacists (0)	0.47 [0.16, 1.41]	0.175
7. Number of home care visits (1 or more)	11.91 [3.47, 40.87]	<0.001*

Note. $*p < .05$

mented more collaboration items, and considered performing more forms of collaboration. To promote interprofessional collaboration in the future, it is important to increase such opportunities.

An important limitation of this study is that it was conducted in a relatively small area, which may impair generalization. By contrast, one of the study's strengths is its clarification of the clinic-level factors related to collaboration among healthcare professionals, which so far has not been formally studied. While interprofessional collaboration is being promoted as a national policy in Japan, it has not sufficiently penetrated medical institutions with opportunities to interact with pharmacists. Therefore, community pharmacists should begin to actively communicate with other healthcare professionals so that they can better optimize patient medication management, which in turn might help promote future collaboration.

Table 5: Poisson Regression Analysis

A. Experiences of collaboration with community pharmacies

	Partial regression coefficient	95% CI		
		Lower limit	Upper limit	*p*
3. Number of nurses/associated nurses (3 or more)	-0.291	-0.652	0.071	0.115
4. Number of pharmacists (0)	0.518	-0.133	1.169	0.119
5. Number of other staff (4 or less)	-0.070	-0.440	0.300	0.711
6. Number of outpatients (≥1001)	0.359	0.001	0.717	0.049*
7. Number of home care visits (1 or more)	1.083	0.677	1.489	<0.001*
8. Ratio of prescriptions that were filled out-of-hospital (100%)	0.515	0.159	0.871	0.005*

B. Attitudes toward collaboration with community pharmacies

	Partial regression coefficient	95% CI		
		Lower limit	Upper limit	*p*
3. Number of nurses/associated nurses (3 or more)	-0.102	-0.341	0.138	0.405
7. Number of home care visits (1 or more)	0.891	0.620	1.162	<0.001*
8. Ratio of prescriptions that were filled out-of-hospital (100%)	0.540	0.300	0.780	<0.001*

Note. *$p < .05$

Table 6: Survey Items

Items	Explanation of each item
Characteristics of the clinics	
1. Type	With beds or without beds
2. Medical specialty	Indicated medical specialty (multiple answers allowed)
3. Facility	Whether the facility has various clinics (multiple answers allowed)
4. Number of physicians	Full-time conversion
5. Number of nurses/associate nurses	Full-time conversion
6. Number of pharmacists	Full-time conversion
7. Number of other staff	Full-time conversion
8. Number of outpatients	Number of outpatients in September 2016
9. Number of home care visits	Number of home care visits in September 2016
10. Ratio of prescriptions that were filled out-of-hospital	Ratio of prescriptions that were filled out-of-hospital in September 2016
Collaboration with community pharmacists	
I. Regional care meetings/service adjustment meetings	
II. Case discussion conferences	
III. Joint workshops/continuing education conferences	
IV. Community service	
V. Sharing information through medical cooperation networks	
VI. Accompanying community pharmacist during home care	

4. Experimental

4.1. Survey method and participants

We conducted a postal questionnaire survey from October 1 to December 6, 2016. We mailed questionnaires to all clinics in Gifu City, Gifu Prefecture, Japan, that were in the Tokai Hokuriku Health and Welfare Bureau's insurance medical institution list (https://kouseikyoku.mhlw.go.jp/tokaihokuriku/gyomu/gyomu/hoken_kikan/shitei.html, April 13, 2017). We asked each clinic's responsible physician to answer the questionnaire. Completed questionnaires were returned *via* an enclosed self-addressed return envelope. However, we excluded four clinics that had been suspended from this list as of September 1, 2016; thus, 355 clinics were ultimately included.

4.2. Survey items

The survey items are shown in Table 6. The characteristics of the studied clinics included the type, medical specialty, medical facility (multiple answers allowed), number of physicians, number of nurses/associate nurses, number of pharmacists, number of other staff, number of outpatients, number of home care visits, and ratio of prescriptions filled out-of-hospital.

The main outcomes were respondents' experiences of, and attitudes toward, the following activities in collaboration with community pharmacies: regional care meetings/service adjustment meetings, case discussion conferences, joint workshops/continuing education conferences, community service, information sharing through medical cooperation networks, and accompanying community pharmacists during home care. For each activity, participants rated their experiences of collaboration by selecting one of the following options: "not conducted," "has been conducted once or several times a year," "has been conducted once or twice a month," and "has been conducted at least once a week." Participants rated their attitudes toward collaboration, on the other hand, by choosing one of the following options: "I would not consider collaboration," "I want to collaborate once to several times a year," "I want to collaborate once or twice a month," and "I want to collaborate at least once a week." We also created a free description column wherein participants could provide more details on their responses to the various items.

4.3. Evaluation and analysis

We compared participants' experiences of and attitudes toward collaboration with community pharmacies according to the characteristics of the clinics. The clinics were stratified for each characteristic to ensure that the proportion of each stratum was closest to 50%. The characteristics included type of clinic (clinics without beds and with beds), number of physicians (one and two or more), number of nurses/associate nurses (two or less and three or more), number of pharmacists (zero or more), the number of other staff (four or less and five or more), the number of outpatients (1,000 or less and 1,001 or more), the number of home care visits (zero or more), and the ratio of prescriptions that were filled out-of-hospital (99% or less or 100%).

To stratify participants according to their experience of collaboration, we grouped all participants who answered the questions with "not conducted" into the "not conducted" group; all other answers were placed into the "experienced" group. As for the attitudes toward collaboration, an answer of "I would not consider collaboration" was classified as "not considering implementation"; all other answers were classified as "considering implementation."

Multiple logistic regression analysis is used for analysis of dichotomous outcomes, whereas Poisson regression analysis for count data (Katz 2006). Based on the results of this stratification analysis, we performed a multiple logistic regression analysis. Factors with a Fisher's exact test value of $p < .25$ in the stratification analysis were considered independent variables; the main dependent variables were experiences and attitudes regarding collaboration with community pharmacies.

We also classified experience of collaboration using a slightly different method: individuals were classified as "experienced" when one or more of the six collaboration items had been conducted or when there was a comment indicating that it had been conducted in the free description section. On the other hand, when none had been conducted or there was no comment in the free description, the answer was classified as "not conducted." We then performed the stratification comparison as before. Subsequently, we conducted Poisson regression analysis to identify the factors influencing the number of collaboration items. We included any factor related to collaboration experience ($p < .25$) in the stratification analysis. The number of collaboration items was used as the dependent variable. The same process of stratification and analysis was performed for attitudes: if participants considered the implementation of even one of the six collaboration items, or they left a comment suggesting this in the free description, they were grouped as "considering." Conversely, when participants had no intention of implementing any of the items and left no comment in the free description, they were classified as "not considering." The stratification and Poisson regression analyses were then performed.

IBM SPSS Statistics 24 (IBM Corp., Armonk, New York, USA) was used to conduct all analyses. We used $p < .05$ as an indicator of statistical significance.

4.4. Ethics approval

This study was approved by the ethics committees of Gifu Pharmaceutical University (approval number: 28-7) and Gifu University Graduate School of Medical Science (approval number: 28-155). In a document sent along with the questionnaire, we explained the following to all participants: surveyed information would be used only for research purposes, their personal information would never be disclosed, the survey results would be published in academic conferences and journals, participation in the questionnaire survey was voluntary, and only medical institutions that agreed to respond to the questionnaire were eligible. Replying to the questionnaire was considered indicative of agreement to participate.

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